AMERICAN DYESTUFF REPORTER

"Circulated Everywhere Dyestuffs Are Used"

Published by Howes Publishing Company, 90 William Street, New York

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

Volume XVIII NEW YORK, NOVEMBER 11, 1929 Number 19

On the Chemical Nature of Dyeing

Introduction—Humphrey Davy's Work—Contribution of Professor Fischer—Loeb's Conclusions—Summary of Physical-Chemical Work—Use of Charcoal—Predominance of Kationic Chromium—Silk's Collagenic Resemblance—Chemical Structure of Cotton—Final Conclusions

By ALAN A. CLAFLIN

TO ANYONE even cursorily acquainted with both the technique of leather manufacture and that of the textile industry, there must occur an appreciation of the many similarities existing between the tanning and dyeing processes. It therefore seems somewhat inconsistent that while in the light of modern chemical knowledge tanning is almost universally admitted to be a chemical combination of hide substance and tanning agent, that dyeing is held to be merely a physical union of textile fiber and dyestuff classified under the somewhat vague term of adsorption. Since the acceptance of the chemical nature of tanning is relatively recent, and because the researches and arguments that lead to this conclusion may inspire those in the position to observe dyeing processes to reason further on their nature, it may be well to review some of the work in leather chemistry. Up to about fifty years ago tanning remained an extremely empirical, one could almost say primitive, industry. True, some great chemists had given its processes some study. A hundred and fifty years ago an Irish chemist, McBride, had observed the swelling effect of acids on hides and suggested plumbing the hides with sulphuric acid before tanning. An innovation of more value to the yield than to the quality of the leather, but nevertheless of much theoretical interest.

Humphrey Davy's Work

Sir Humphrey Davy devoted much attention to the tanning processes, contributed to the knowledge of the nature the vegetable tannins, and devised the first means of assaying them. Prof. Friedrich Knapp, of Berlin, in the middle of the last century investigated the tanning properties of inorganic salts and narrowly missed inventing a practical chrome tannage. Yet until the advent of Prof. Henry R. Proctor, of the Leather School at Leeds, England, it can be fairly said that, in so far as it affected the industry, leather chemistry was not advanced beyond the days of the Phoenicians. Professor Proctor's work covers the last quarter of the nineteenth century and the first fifteen years of the present one, and he is rightly regarded as the father of leather chemistry. Devoting his attention first to a general rationalization of the preparatory and tanning processes and to the development of a method of analysis that would enable the tanner to properly evaluate his tan liquors and vendor and buyer to get fairly concordant opinions of the tannin value of commercial tanstuffs, by the end of the last century he appreciated that until the physical chemistry of protein swelling was understood, leather chemistry would not be on a scientific basis. The simplest phenomenon of protein swelling is observed in what is known as the pickling process. In this process the limed skin is immersed in a dilute solution of sulphuric acid and undue swelling prevented by the addition of a large amount of common salt. The last fifteen years of Professor Proctor's life were practically devoted to the study of the reaction between hydrochloric acid and gelatine. He studied the simplest possible case—the swelling of gelatine by hydrochloric acid in the presence of common salt. It may be well here to make a little reference to what is known of the chemical constitution of collagen and gelatine. Collagen is the main substance of the corium layer of a hide, which in combination with tannin forms leather. In its raw state collagen can be dissolved or colloidally dispersed in boiling water; this colloidal solution, unless too dilute, on cooling sets to a jelly. This jelly dried is gelatine; it is a hydrated collagen. It is a reversible or lyophilic colloid and classed as a protein. The proteins have long been known to be compounds of carbon, hydrogen, oxygen and nitrogen, and their constitution has been extensively studied.

Contribution of Professor Fischer

Particularly due to Prof. Emil Fischer and his co-workers at the University of Berlin, who actually made synthetic proteins, these bodies have been proved to be condensation products of amino acids. An amino acid is one containing both NH_2 (amino) and COOH (carboxylic) groups, and in condensation these groups combine with the elimination of water. This combination or linkage is important, as it is at this point that much of the chemical activity of the protein molecule or nucleus exists. Successors to Fischer have proved, at least for some proteins, that there exists an hexagonal grouping, and that proteins are not only polypeptids but are substituted dioxo-piperazines.

Proctor in the course of his studies on the effect of acid on gelatine early appreciated the influence of hydrogen-ion concentration, and much of the present recognition of the usefulness and importance of pH or potentiometric measurements generally is due to him. A result of his work, and in which he was ably assisted by his American student, John Arthur Wilson, is what is known as the Proctor-Wilson theory of protein swelling. According to this theory, protein, even in the organized form of a gel or, for that matter, hide fibrous collagen, is an amphoteric electrolyte, which under certain conditions dissociates into an immobile and a mobile ion. At pH below the iso-electric point of the protein the cation is immobile and at pH above the iso-electric point the anion, or in old-fashioned language in acid solutions, the protein acts as a base and in basic solutions as an acid.

The establishment of the Proctor-Wilson theory was facilitated by the publishing by Prof. F. G. Donnan, of the University of London, of his work on the equilibria existing between the respective sides of a semi-permeable membrane when the electrolyte on one side has both ions mobile—i. e., diffusible—and on the other side only one ion can pass through the membrane. As the Donnan equilibrium was derived from thermo-dynamical data and it agreed with the Proctor-Wilson conclusions based on electrical considerations, it is an independent confirmation and hastened the publication and general acceptance of the Proctor-Wilson theory. So much stimulation was given to the proponents of the chemical nature of colloidal phenomena by the Donnan and Proctor-Wilson researches that Dr. Jacques Loeb, of the Rockefeller Institute, felt the distinctions between colloidal and classical chemistry were swept away, and published much experimental evidence that if hydrogen-ion concentrations were considered the combinations of proteins with acids and bases were as conformable to stoichiometrical laws as simpler chemical entities.

Loeb's Conclusions

Exception was somewhat generally taken to the extensiveness of Loeb's conclusions, and many feel that he would have modified his views had not untimely death robbed colloidal chemistry of one of its most brilliant minds. The phenomena, however, that proved stumbling blocks to the Loeb generalizations have, however, tended to be brought in line by the work of Dr. K. H. Gustavson, a Swede by birth and educated in Sweden and Switzerland, and now occupied as a leather chemist in this country.

Dr. Gustavson introduced into the discussion the hypotheses of Prof. Alfred Werner on the nature of valence, particularly what is known as the Werner concept. Professor Werner, devoting about twenty years, approximately from 1890 to 1910, to studies of valency mainly directed to inorganic double salts, but later considering carbon compounds, emphasized what may be termed the variable or conditional character of this force. He distinguished between primary and what he termed auxiliary valencies. He explained the difference in behavior of isomeric compounds to the difference in mutual attraction of the component atoms.

While in considerable degree the establishment of the electronic nature of the atom by the researches of Rutherford, Bohr, Plancke and others has lessened the importance of Werner's work and demonstrated his concepts inexact, yet in another sense his work anticipated the present complex atom and is confirmed by the discoveries of the physicists. Applied by Gustavson to moot points in chrome tanning, Werner's concept has been a useful hypothesis. He cleared up murkiness in regard to the composition of tan liquors and by an ingenious use of Permutite separated kationic chromium complexes from anionic and proved that both combine with collagen and that, while an amphoteric electrolyte may be positive in its primary valence, there exists a residual or auxiliary valence of opposite charge.

Summary of Work

To summarize, it is reasonably well established by the work of Donnan, Proctor and Wilson, Gustavson and others working with physical chemical methods in leather chemistry, that immobility does not deprive a chemical ion or micelle of reactivity; that such reactivity is due to electrical charges induced by ionic activity in contiguous aqueous solution, and in turn that this reactivity affects ionic activity in the contiguous aqueous solution; that the reactive molecule or nucleus of gelatine has a relatively small molecular weight—i. e., of the order of 700 to 750; that the points of reactivity are at the NH-CO linkages rather than at terminal NH_2 and COOH groups; that vegetable tannins as acids chemically combine with kationic collagen, and that in chrome tanning chromium complexes combine both in the anionic and cationic state; and, finally, the compound leather is of slight solubil-

ity and does not therefore dissociate and exhibit the chemical reactivity of collagen.

Dyeing is a more diversified process than tanning. There are minor differences between skins, mainly due perhaps to the age of the animal, but the collagen of all is essentially chemically the same. The vegetable tannins, while having individual distinctions, fall into one of two closely related chemical classifications.

The other tannin process of importance—chrome tanning—is so totally different from vegetable tanning that it offers confirmatory and corroborative evidence as the correctness of hypothesis rather than complicating the subject. So in dyeing, fibers widely different, and coloring matters of wide variety, while adding complexity, also afford so many points of view and diverse angles of approach that the actual character of the dyeing processes may be the more accurately classified if not positively determined.

In the first place, there is no essential reason to assume that all dyeing processes are the same. Rather is the evidence all the other way. True, in every dyeing process there is the one element in common—that the fiber removes a certain proportion of dyestuff from the dye bath—but the percentage removed varies in all proportions and the combination of fiber and dyestuff in all degrees of permanency.

Use of Charcoal

The physical chemist adds some charcoal to a solution of Methyl Violet and the color is removed or most of it is, he puts some wood in a like solution and the same thing happens and he says these are phenomena of adsorption. Probably true, but no one who has a modicum of knowledge of dyeing considers staining wool with Methyl Violet a dyeing process. In fact, as a dyestuff Methyl Violet is rather considered a cotton than a wool color, but untreated cotton adsorbs practically none from a solution. Tannic acid, on the other hand, combines with Methyl Violet in such definite proportions as to be fairly considered stoichiometrical. The combination of tannic acid with cotton is nothing like so definite in proportion as is its combination with Methyl Violet, but on the other hand it is not much more indefinite than the combination of tannic acid and hide fiber.

Tanned cotton takes up Methyl Violet from a solution in a manner far different than raw cotton. If the tanned cotton is treated with certain antimony-containing compounds and is then dyed with Methyl Violet a combination is obtained that is more resistant to hydrolysis, hydration, solvation, or, as the practical man would say, washing, than is the cotton annic acid dye combination alone. Apparently it is not kationic antimony that is taken up, but either an antimonous acid or more complex anion. Altogether this whole cotton tannic acid, antimony basic color association is a splendid opportunity for study, according to the methods of Werner.

To return, however, to the wool fiber, this is a protein like collagen, except it contains a considerable percentage of sulphur. Apparently this sulphur atom is the susceptible point in its molecular structure, that is, under certain conditions, while wool resists hydration by boiling water better than collagen; in the presence of aqueous solutions of alkalies or alkaline sulphides it rapidly goes into an irreversible colloidal solution. Perhaps it would be more exact to say it forms a colloidal solution of proteins that are obviously degradation rather than mere hydration products of the wool or keratin, as the wool protein is termed, itself. The fact that the keratin molecule tends to disintegrate in the presence of an excess of hydroxide ions, but is extremely resistant in the presence of an excess of hydrogen ions indicates that while it is an ampholyte (amphoteric electrolyte) that it is a weaker acid than it is a base. This conclusion is substantiated by the avidity with which wool takes up or combines with acids in aqueous solutions. Now when a dyer wishes to put a fast color on wool he applies a chromium mordant. There is much analogy between chrome mordanting and chrome tanning. Both are combinations of chromium or chromium complexes with a protein.

Predominance of Kationic Chromium

Gustavson has shown that in chrome tanning both kationic and anionic chromium are combined with collagen, but that in the usual processes the kationic chromium predominates. With wool it is the general experience that the fastness colors are obtained when the wool is boiled with bichromates in the presence of tartaric or lactic acids. Under such conditions a large proportion of the chromium is unquestionably present in the form of anionic chromium. Indeed both tartaric and lactic acids or their neutral salts are particularly efficacious in removing kationic chromium from chrome tanned leather. A color lake that is the combination of the dyestuff and chromium undoubtedly takes place as readily, probably more so with kationic chromium, than with anionic, but this is not the combination that is firmly attracted to the wool. In the case of acid dyeing this has all the elements of an esterification, the positive element of the keratin attracting the anionic color radicle.

With esters the stability is the reverse of inorganic bases, the weaker the acid the more stable the ester, and the weak acid replaces the stronger acid. Perhaps a more correct way of expressing this would be to say the hydrogen ion and strong anion remain in solution or degree of dissociation of the ester is less than water. In the case of dyestuffs, e. g., the sulphon cyanines, that are dyed with ammonium acetate, presumably act as still weaker acids than the true dyes. Ammonium acetate in aqueous solution does not boil acid, but in the presence of wool the keratin is a sufficiently strong base in view of the limited solubility of the ammonium ion at the boiling temperature to attract the acetic acid and permit ammonia

to escape. The keratin acetic ester is, however, less stable than that of the still weaker color acid, and on prolonged boiling the acetic acid is replaced by the color acid.

A confirmation of this hypothesis is that the combination of wool and dyes of sulphon cyanine type is more resistant to washing and scouring than the combination with the true acid dyestuffs. While with colors dyed on a chrome mordant the evidence seems preponderant that the chromium or chromium complex combines with the wool and then the color with the chromium, the natural inference is that it is the other way about with the top chrome colors. There perhaps is no reason to assume that it is always one way or the other. That anionic chromium gives a better and faster color in some cases is certain, thus the colors of the chromotrop class give shades superior in fullness and depth, and also much faster to fulling if lactic acid instead of acetic acid is used in the after-chroming bath.

Silk's Collagen Resemblance

Silk is a protein more nearly resembling collagen than keratin. The evidence is that it is rather a simpler compound than collagen, at least the degradation products of the silk protein are among the simplest of the amino acids. The dyeing of silk in general is more analogous to the dyeing of leather than are the other textile fibers, but in examining this analogy it should be appreciated that the protein behavior of leather is materially modified by the tanning process. Unquestionably silk is amphoteric and its combination with acids and bases should afford opportunity for verification of the Donnan, Proctor and Wilson hypotheses.

Perhaps a simpler point of attack from physical chemical view than that of dyeing is the closely associated process of silk weighting. Indeed it would seem as if this process were an almost perfect opportunity for the Werner concept of primary and auxiliary valences. It it to be hoped that the large silk laboratories or the university laboratories interested in silk chemistry may make determinations that will afford either confirmation of these hypotheses or provide additional complications for their proponents to explain. Since silk is most closely related to gelatin of the textile fibers and gelatin is the protein, the physical chemical properties of which have been most extensively studied, and since there are manufacturing processes that comprise not only of the combination of the silk fiber with dyestuff, but also include its combination with inorganic salts it would certainly seem that sufficient data are available for investigation if properly correlated.

Chemical Structure of Cotton

There is, however, no obligation to assume if it were absolutely demonstrated that silk dyeing is a chemical combination that cotton dyeing is also, as the chemical constitution of these fibers is so different. Fortunately the chemical structure of cotton has been the most positively established of any of the textile fibers. Much credit for this knowledge must be given to the physicists, who by the use of X-rays proved what the organic chemist could only surmise. Further, the development of the chemical reactivity of cellulose, first from its use in explosives and plastics and second its regeneration in fibers as rayon, has lessened the investigation necessary to prove chemical combination with dyestuffs. With cotton, therefore, it has been rather a question of investigating the chemical nature and reactivity of dyestuffs than of the fiber. This work has been done and has been particularly well described by Paul Bary in one of the French textile papers, and a translation of his article has opportunely appeared in a very recent issue of the American Dyestuff Reporter.

Based fundamentally on the work of McBain on soap solution, it is established that the reason direct cotton dyestuffs do not combine in definite proportions with cotton is because the dyestuffs exist in solution partly in the molecular form and partly as molecular aggregates or micelles. The combination of these direct cotton dyestuffs with the cotton fiber gives even more evidence of being an esterification than does the combination of acid colors with wool. Indeed, there has always been an inconsistency about the assumption of esterification with the acid colors because a dilute solution of a strong acid usually tends to hydrolyze an ester rather than assist its formation. With cotton the inconsistency is absent, and the readiness with which cellulose forms esters is well known. The establishment of the chemical nature of dyeing is not really then so much a necessity for determining new facts as properly classifying and arranging information available so proper deductions may be made. In condemning the term adsorption as not giving adequate or satisfactory explanation for dyeing phenomena, it must not be inferred that some well-known process of dyeing are not adsorptive in their nature. An example of this is in dyeing with Indigo, and a very simple experiment will demonstrate the difference between Indigo dyeing and the average operation. As stated in the beginning there is no essential reason for assuming all dyeing processes to be of the same nature, but the evidence is preponderant the chemical forces are the essence of the truly dyed fiber.

Progress is very largely dependent on our capacity to make mistakes. The wise man profits by the information which those mistakes place in his hands.—*Black and White.*

In the last analysis what the consumer or the user of the textile thinks about, what good or bad he finds in it, will determine the popularity of that product and the success of its producer.—*Rayon and The Rayon Journal.*

Textiles and Rationalization

Attitude Toward Rationalization—Its Ideal Form—Question of Distribution—Introduction of Improvements—Possibilities of Rationalization

By FRED. GROVE-PALMER, A.I.C.

THE way in which the great majority of people fight shy of discussing rationalization in the textile industry is rather amusing. When the matter is occasionally brought up in conference or in staff and executive meetings, one may see people wag their heads very wisely and suggest that the matter be shelved until the meeting-after-next, so that they may have an opportunity of asking someone what it is all about and whether it is a nice subject for family men to talk over. The operatives, taken as a whole, seem to look upon rationalization as a method adopted by the German capitalists for grinding the faces of the poor and turning the ordinary mill hand into a mechanical outpourer of profits for the employer without anything for himself.

In reality, rationalization is not a bit like that; there is no slight reason why it should not be freely discussed by all classes, and the more it is talked about the more clearly will everybody concerned come to view the advantages that will accrue from its introduction under suitable conditions. From time to time the newspapers have given space to matter dealing with rationalizing industry, but far too often the writers of these articles have been biased in one or another direction, or have not properly grasped the principles underlying it. Not so long ago a newspaper on the other side published a series of articles on rationalization written by a man who frankly admitted that he knew nothing about it; but that trifle did not deter him from pouring out half a column of opinion every day for a week or so.

It might be as well to define rationalization as scientific management, but one must necessarily be very careful in making use of those words. Although this is the land of its birth, it must be confessed that scientific management, as originally propounded, has found as little favor here as it has in Europe. It is true that rationalization does mean scientific management, properly so called, but it also means more than that: it includes standardization of every factor in the industry, general stabilization and industrial simplification; all of which has been very ably pointed out by David Houston in his illuminating remarks in another connection.

Ideal Form of Rationalization

The ideal form of rationalization would be international in extent, and its scope would include all forms of industrial and commercial activity. If this could be attained, there is no shadow of doubt that living conditions of every man and woman in the civilized world would be greatly improved.

We are here concerned, however, only with the textile industry, and it may be stated quite shortly that if the organization of the trade, both from the point of view of the manufacturer and of the distributor, were to be placed upon a rational footing it would be found that the output of fabrics and goods generally would increase, the working conditions of the backward and aged mills would be greatly improved, the lives of the workers would be brightened, and the costs of production would be greatly lowered.

When we are speaking in public we may at times announce that our methods of distribution are the best ever, but when the matter is discussed behind closed doors we know that there is still a long furrow to be plowed before we can call it perfect. There is no denying that rationalization would go a long way toward bringing about the desired improvement.

In the mill itself, rationalization means the production of the greatest possible labor efficiency with the least physical effort, and this will be brought about by scrapping all the inefficient machines that still clutter up our mill rooms and the installation of the latest inventions as fast as they come into the market. This is going to put a heavy premium on brains.

Another great advantage will be the standardization of patterns and cutting out an enormous number of totally unnecessary minor differences between the fabrics of one mill and another. They are not wanted; the multiplicity of styles is a burden to everybody, from the winders and spinners of the yarn right through to the poor woman in the store who sees so many kinds of material that she goes away without buying and because she cannot make up her mind which to choose. Such a simplification would not mean bringing an end to originality of design or a general leveling up to one uniform type of cloth, but it would obviate a great part of the expense involved in continually altering the machinery to deal with small quantities of different sorts of materials.

There is, perhaps, no more important feature of rationalization than the entire doing away with all waste of power and raw materials. That is what is aimed, at any rate, though it may only reach the stage of reduction of waste by direct control and by better methods of utilizing it. Consider, for example, the

waste of coloring matter that goes on in many dyehouses. It may only represent so many hundredths of a cent per yard of cloth dyed, but taken over the industry the total amount is colossal and might well be devoted to some useful purpose. That old confession of the inefficient dyer, that he is far too busy to fuss over the unexhausted dye bath which is allowed to run into the sewers, would never be heard if the industry were rationalized. The damage of valuable fabrics through careless finishing and bad handling in other departments would be reduced by making it impossible for such carelessness to occur by an expansion of the methods now adopted successfully by wide-awake employers. Great savings can also be effected by the recovery of soap, salt and Glauber's, while the field for economy in the way of fuel and steam is very wide.

Question of Distribution

Alluding once more to the question of distribution, it is evident that much good could be wrought by greater economy of effort; this could be brought about by the reduction of shipment costs through improved routing and also by simplifying the methods of sale. The elimination of some of the people who handle goods in the passage from mill to the consumer would permit of a good many men utilizing their energies to greater advantage in other fields of commerce and, at the same time, lessening the expenses of distribution of textiles.

The betterment of the conditions of living of the population of the country that would result from such improvements in working as those indicated would make it well worth while introducing them. The selling prices of fabrics would fall without causing any reduction in wages, any lowering of quality or cutting of profits.

The close attention that would be paid to actual needs of the various markets under a rationalized system would insure the right goods being sent to those places instead of loading them with materials they do not want, but this would not interfere with the introduction of novelties. It would guide and direct efforts which, at present, are far too often futile.

Introduction of Improvements

It does not require very much imagination to understand that the introduction of improvements along these lines could only result in increasing the earnings of producers and—a point that is even more vital to comfort—in rendering those earnings more stable and less liable to the periodical fluctuations that are the bugbear of many classes of operatives. The weaving and dyeing of cloths for sale can go on indefinitely; it is when the work is being done for stock that the stoppage soon comes.

It cannot be denied that a sudden switch over in the mill to methods that produce 100 per cent efficiency might cause some dislocation of labor which would be far from desirable. The proper steps would have to be taken to prevent this and to make full arrangements for the absorption of every worker. This could only be effected by the complete organization of labor on the most broad-minded lines whereby the requirements of all could be thoroughly appreciated. It has never been fully realized, even among ourselves, that the greater number of labor troubles that have arisen have been due more to misunderstanding than to concrete grievances. To those who say that such organization is impossible, it is only necessary to mention the "B. and O. Plan." What is that but rationalization under a different name? If it is successful on the Baltimore and Ohio line, on the Chicago and Northwestern, the Milwaukee and St. Paul, and other railroads, including the Canadian National Railways, there is no reason why the textile industry could not benefit by a similar scheme. What is it but rationalization, again under another name, that has enabled President Hillman of the Amalgamated Clothing Workers of America, a man of great genius, aided by a wonderful corps of economists, statisticians and experts of all kinds, to transform that industry? There could be no finer testimony to the splendid effects of rationalization than the remark made by the judges when awarding the Harmon Medal: "The Union not only reorganized conditions in a major industry, but has also been a laboratory where labor's new share in the life of the community is being worked out." Similar good work has been done among the printers and pressmen, and there is nothing to prevent the textile industry as a whole from benefiting in the same way.

It is granted that the work here alluded to has been limited in its bearing upon the industries concerned, but it has been a magnificent start. Rationalization cannot be left in the hands of a few men, not even though they may be level-headed business men; all sorts and conditions of men must be roped in to participate in the education of governments, public bodies, federations and even public opinion. By comparison of all processes the best will be evolved, and when they are working smoothly the outlook of individual mills and factories will be studied, for it is not only the big firms that are to benefit; companies of all sizes are equally important as cogs in the wheels of the machine and must come into line with the rest, for if they did not it can easily be seen that they might be left behind in the race because of their lack of efficiency; this is most undesirable.

Possibilities of Rationalization

Rationalization knows no limits; it applies to every form of human activity almost; industry, commerce, agriculture, finance, and even, so the idealists tell us,

to the management of the home; but that is getting a little out of the depths of the present discussion.

From the point of view of the textile industry alone it will become necessary to avoid much of the present labor turnover that is a costly waste of money. The gravitation of unsuitable workers into uncongenial employments would be minimized, if not entirely done away with, by a broadening of the present methods of vocational analysis. By placing the workers right they will be given fewer hours of work and longer time for the leisured enjoyment of life that is the right of every man and woman in the world. There will be less cause for discontent on the part of the worker and of the shareholder, and from this arises peace.

This spreads. Other nations, seeing the success, would follow suit, and so the will toward international peace would grow. Rationalization is one of the stronger tools in the hands of those who are working toward a world peace. This may all be a trifle Utopian, but was it not Lebbeus Harding Rogers who said: "If you want to shoot a squirrel sitting in a tree, aim high"? While Emerson, in "Civilization," advises: "Hitch your wagon to a star." We may not see these great results in our time, but that need not prevent us from using our endeavors in the direction of improving our own industry.

COMMUNICATIONS

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WASHINGTON

October 28, 1929.

Editor, AMERICAN DYESTUFF REPORTER,
New York City, N. Y.

Gentlemen: The Copyright Office has received your letter of October 24.

Section 3 of the Copyright Act provides that

> ". . . The copyright upon composite works or periodicals shall give to the proprietor thereof all the rights in respect thereto which he would have if each part were individually copyrighted under this Act."

This is the general rule, and was applied in the case of Dam *vs.* Kirk La Shelle Co. (175 Fed. R. 902). On the other hand the rule is subject to the qualification that the right to obtain copyright in the individual parts of the periodical referred to must belong to the person or firm claiming copyright in the periodical as a whole. This qualification was set forth in the case of Mail & Express Co. *vs.* Life Pub. Co. (182 Fed. R. 899).

Whether the copyright of any particular advertisement in a newspaper is covered by the general copyright of the newspaper would seem to depend on the agreement, express or implied, made before publication between the owner of the copyright in the newspaper and the owner of the literary and artistic property in the copy for the advertisements, whether it is the advertiser himself or some advertising agency or other person holding the position of author of the material.

Respectfully,
(Signed) WM. L. BROWN.
Assistant Register of Copyrights.

[*The above letter was received in reply to an inquiry made by one of our advertisers. Inasmuch as it may interest others, we are reprinting it in full.*—EDITOR.]

October 25, 1929.

Editor, AMERICAN DYESTUFF REPORTER,
New York City, N. Y.

Dear Sir: In your issue of September 16, 1929, Mr. Raymond Curtis invites correspondence on the aftertreatment of dyed Viscose Rayon and Beta Naphthol and Common Salt. May I be allowed to say that hundreds of pieces have been treated on the jigger in Great Britain with a definite improvement in the uniformity of the dyeing.

I can only confirm that aftertreatment with Beta Naphthol is particularly successful with Chlorantine Fast Green BL. It must be remembered, however, that this Beta Naphthol aftertreatment is not effective in all cases. It is more effective in cases where the variation in the dyeing affinity of the Viscose is due to physical rather than chemical causes.

Yours faithfully,
C. M. WHITTAKER.
39, Albert Road, Cheadle Hulme, Cheshire.

THE PAD AND PENCIL HABIT

Talk about wide-awake clients, the other day a poultryman came to ask us whether "hypo" is really good for laying hens.

We said that it was credited with increasing iron assimilation, aiding digestion, keeping hens healthy, and so forth, also that it is mixed with cattle foods.

"How much does it cost?" asked the poultryman, and when we told him, out came his pad and pencil.

"If it increases my egg production by one egg per hen per year," he said, "it will pay me—send out a hundred pounds and I'll try it."

That is the way to go at chemical advice—with a pad and pencil.—*Chemistry and You.*

H. H. Knowles, the Pacific Coast representative of the Reading Chain & Block Corporation, of Reading, Pa., has announced the appointment of the Murry Jacobs Company, 554 South Pedro Street, Los Angeles, to represent the Reading Chain & Block Corporation in Southern California.

Dyeing, Bleaching and Finishing in the South Diversifies and Expands

Introduction—1923 Was Banner Year—In the Past Six Years—Rayon Has Had Its Influence—Special Package Processing—Conclusions and Summary

By DUNHILL MARSDEN

[*From warp yarns, to coarse cottons, to fine cottons, to rayon and pure silk—this is the movement that has occurred in Southern finishing. This article brings up to date the record made to 1923 in a previous article; and discusses recent trends in dyeing, bleaching and finishing in the South. Knitting, group finishing, rayon—all have had their influence in the further expansion of this Southern industry.*—EDITOR.]

IN an article published in the January, 1924, issue of Cotton, an effort was made to chart briefly the record of commercial bleaching and finishing in the South. The period covered in that survey was, of course, ended during the latter part of 1923—a year which more than any like period saw a most healthy and expanding growth, as well as much diversification in process and product handled. The period covered began, properly, with the building of the Kerr Bleachery & Finishing Works, at Concord, N. C., in 1890, with which commercial bleaching and finishing in the South began in a practical way.

That article discussed some of the reasons why the finishing end of the industry trailed fabric manufacture in its southward movement; and by a more or less chronological record of the major plants, demonstrated how progress affected this branch of the industry, offsetting many ungrounded prejudices and objections to finishing in the South.

The present article is written with the thought of picking up the story where it was terminated in the previous chronicle, and of bringing up to date, in a brief way, the continued story of dyeing, bleaching and finishing in the South.

As was the case in the previous article, this investigation is confined to those plants of a commercial character; not including those private enterprises—plants established for their own processing by manufacturing plants—as this would make too unwieldy a record.

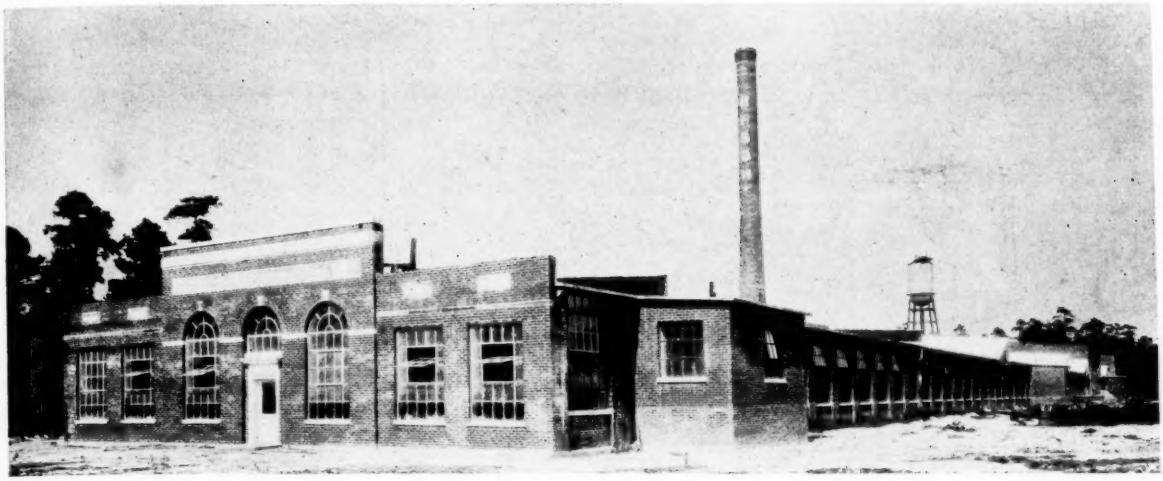
It is interesting in beginning to make reference to an observation made by a figure prominently connected with the finishing industry. He points out that the South first started with warp yarns, graduating from those into coarse goods, and from there into the finer cotton piece goods, rayon and pure silk. He adds that there can be considered no limit to the variety and grade of products possible to be finished in the South; that an interesting possible development is the grouping of several mills either by reason of territorial proximity or because of similar product to establish what might be styled a community finishing plant. This, of course, would be classified more properly under private enterprises, and not necessarily as a commercial plant, but the possibility of the trend in this direction is interesting as a means of further extending the industry.

1923 Was Banner Year

It will be necessary frequently in this outline to refer back to January, 1924, for various reasons. As indicated, the increment of the year 1923 was preponderant, and many of the larger plants were either announced, started, or placed in operation during that year. Prior to that time, as the previous article showed, development in the finishing industry had been slow. The arguments advanced in earlier years as objections—mainly the "undesirability" of the water for dyeing, finishing, etc.—have become so thoroughly dissipated as to have been well-nigh forgotten, with the development of suitable filtration and treating equipment when needed.

For the sake of record, it will not be amiss to summarize, briefly, the growth of the industry as it was recorded in a previous article. First came the pioneer period, following the Kerr plant at Concord, when between 1895 and 1903 the following plants were established in the order named: Lanett Bleachery & Dye Works, Lanett, Ala.; Ohio Falls Dye & Finishing Works, Louisville, Ky.; Clearwater Bleaching & Finishing Company, Clearwater, S. C. (later remodeled as a cotton mill), and Union Bleaching & Finishing Company (now Union Bleachery), Greenville, S. C.

After this beginning others came, but not rapidly. There was the plant erected by the Crystal Springs Bleachery Company, in Chickamauga, Ga.; the Keystone Finishing Mills, at Burlington, N. C.; the Southern Mercerizing Company, Tryon, N. C.; Standard Processing Company (now Standard-Coosa-Thatcher Company), Chattanooga, Tenn.; Proximity Print Works, Greensboro, N. C.; National Dye Works, Burlington, N. C.; American Finishing Company, Memphis, Tenn.; American Processing Company, Mount Holly, N. C.; Dixie Mercerizing Company, Chattanooga, Tenn.; Elmore Company, and Spinners' Processing Company, Spindale, N. C.; Spray Bleachery, Spray, N. C.; Yates Bleachery



Hartsville Print & Dye Works, Hartsville, S. C. The first plant built in 1928 was 70 by 800 feet, and was later doubled in size and capacity. Robert & Co., Inc., Atlanta, Ga., engineers.

Company, Flintstone, Ga.; Southern Franklin Process Company, Greenville, S. C.; North Carolina Finishing Company, Yadkin, N. C.

All of these got under way before the year 1923, and now a brief list of its additions will indicate its importance: Lowell Bleachery South, Griffin, Ga.; Southern Bleachery, Inc., Taylors, S. C.; Ware Shoals Bleachery, Ware Shoals S. C.; Pacific Mills Bleachery, Lyman, S. C.; U. S. Finishing Company plant at Cedartown, Ga.; Gregg Dyeing Company, Graniteville, S. C.; Thomaston Bleachery, Thomaston, Ga.; Sayles-Biltmore Bleacheries, Swannanoa, N. C., and others.

In the Past Six Years

Whether as a coincidence or direct result, or as a perfectly natural development, this tremendous expansion followed closely upon an appeal from the late General Lawrence D. Tyson, at that time president of the American Cotton Manufacturers, that more Southern products be finished in the South. With so encouraging an impetus as came in 1923, progress has continued, and other influences have changed its main course in many ways, and it is now the purpose of the present article to discuss this development since 1923, and some of the factors that have had a bearing upon it.

Rayon Has Had Its Influence

As an illustration of changed conditions, a careful reading of the story referred to, bringing the history of the industry up to 1923, fails to disclose any reference to rayon, and yet, since that date, much of the construction and expansion has been influenced directly by this prodigy of textile fibers, which has made itself felt in so many ways. Several of the plants already established found it necessary to adapt themselves to the handling of this new fiber, either in piece or yarn form, or as stripes in finer cotton fabrics, etc., but its effect was more far-reaching than that. Industrial Dyeing Corporation, Charlotte, N. C.; the Southern Dyeing Company, Burlington, N. C., established by E. W. Sweet and others; the Southeastern Bleach & Dye Works, Inc., Salisbury, N. C., formed by T. H. McKay and others; Ray-Ser Dyeing Company, Chattanooga, Tenn., and several other plants, while handling at the same time cotton yarns, were formed almost directly in response to the demand for plants to handle the latest addition to the list of processed textile materials.

In addition to these, rayon processing needs were responsible directly for the establishment of the Yarns Corporation of America's plant at Spartanburg, S. C., for the dyeing and handling of rayon upon a commission basis. This concern recently amalgamated with New York interests, a step which would indicate plans for future growth. Carolina Dyeing & Winding Company, Mount Holly, N. C., is another plant whose formation may be attributed in great part to the advent of rayon. Organized by interests experienced in this line of work in other sections, and especially equipped for the purpose, as well as for handling cotton yarns, this plant is now operated by the Franklin Process Company which, in addition to this plant and the Southern Franklin Process Company, in Greenville, S. C. (previously recorded) operates also a plant, Central Franklin Process Company, Chattanooga, Tenn.

Special Package Processing

The dyeing, bleaching, mercerizing, gassing, etc., of cotton yarns, particularly in special package form, was the impetus for other plants, among these being the Belmont Processing Company, Belmont, N. C., since taken over by the Aberfoyle Manufacturing Company; Clover-

dale Dye Works, High Point, N. C., organized by the controlling interests of Adams-Millis Corporation; and Green River Manufacturing Company, Tuxedo, N. C., commenced operation in 1925, specializing on bleaching, dyeing and finishing fine counts of cotton yarns for the hosiery and shirting and allied trades. The National Yarn & Processing Company, Rossville, Ga., formed by Tom McKinney and others for mercerizing, bleaching and dyeing cotton and rayon yarn, has been taken over by the Standard-Coosa-Thatcher Company.

In at least two cases other than that of the Franklin Processing Company already reported, the period since 1923 has seen Southern plants established upon the basis of special packaging for yarn handling. One, the Thies Dyeing & Processing Company, Belmont, N. C., was organized to bleach, dye and finish yarn in package form on Thies dyeing machines; another is the commission plant operated at Stanley, N. C., for handling yarn in package form on the Craig-Hornbuckle machine.

Expansion in knitting, calling for yarn finishing as well as for plants to handle gray goods finishing, has been responsible for several commercial plants. The National Dye Works, Burlington, N. C., now a part of the May Hosiery Mills, handle the dyeing of a large number of hosiery mills in and around this hosiery-producing center. The American Dye Works, Burlington, N. C., recently acquired the dyeing and finishing department of the Love Knitting Company, and is used for finishing gray materials from a number of large knitting plants.

Returning now to the processing of piece goods, particularly cotton—which constituted the bulk of the development up through 1923—we find a number of interesting growths. Reference was made previously to the establishment of the Southern Bleachery, Inc., by Harry R. Stephenson and associates. Just a few years ago these same interests erected, adjoining the bleachery, the Piedmont Print Works, which is equipped to handle light-weight multi-colored prints in tub fast color.

Another outgrowth is the American Warehouse division of the Marshall Field interests, at Spray, N. C., which is prepared to dye and finish wide piece goods for the automobile trade.

Gossett Dyeing & Finishing Company, Anderson, S. C., was established for the finishing of products of associated mills, specializing on vat dyed fast color romper cloth and similar lines.

Hanes Dyeing & Finishing Company, Winston-Salem, N. C., was erected to specialize in piece dyed goods in the heavier weights. Ralph Hanes is manager, with H. A. Jolitz superintendent. The plant is prepared to handle the bleaching, dyeing and finishing of piece goods.

Holliston Mills of Tennessee, Inc., Kingsport, Tenn., is operated by Holliston Mills, Inc., to dye, bleach and finish book cloth.

Hartsville Print & Dye Works, Hartsville, S. C., was formed by Fred B. Voegli, of the Easton Finishing Company, of Easton, Pa., and Samuel Hayes, of the Bronx Finishing Company, handling a very extensive line of bleached, dyed, printed and finished piece goods of all descriptions. This concern was recently acquired by the U. S. Finishing Company as a further step on their part in enlarging their Southern operations. The Renfrew plant of the Brandon Corporation, Traveler's Rest, S. C., are bleachers, mercerizers and dyers of piece goods.

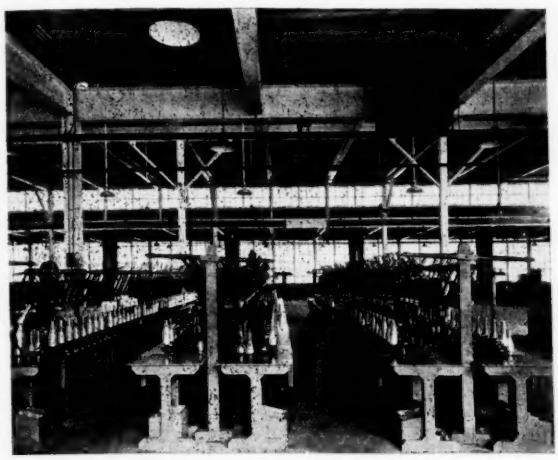
At the present writing construction work is under way on the Fair Forest Bleachery at Fair Forest, S. C., being erected by H. A. Ligon, of Arcadia Mills, and associates; and also the Rock Hill Printing & Finishing Company, at Rock Hill, S. C. Also, a large dyeing, mercerizing and finishing plant is being erected at Clearwater, S. C. the site of the old Clearwater Bleaching & Finishing Company, by the Loring interests, which recently acquired several large cotton manufacturing plants in that vicinity.

It is felt that this list is practically complete in bringing the record up to date. It must be emphasized again that these records take into account only those plants which do commereial or commission finishing in its various forms, and do not include the hundreds of spinning, weaving, knitting and other mills which maintain and operate dyeing and finishing plants for their exclusive use. This list would represent a tremendous investment in itself, many private plants surpassing in volume and incestment many of the commercial enterprises.

As to the future of finishing in the South, this has been definitely determined, and further expansion and development is certain. It is doubtful even now, whether any but the very youngest of the plants thus far established has failed to expand either in physical property or type of process or both. An instance is the plant now known as the Union Bleachery, at Greenville, S. C., which in addition to the original cotton piece goods finishing is handling also rayon fabrics, and for which a print works was recently announced.

Renfrew Plant, Brandon Corp., Traveler's Rest, S. C., Completed in 1929; J. E. Sirrine & Co., Engineers.

Accessibility of manufacturing plants economical advantages of the South, extension of process to the ultimate product—these are among the reasons, in addition



Interior View at Yarns Corporation of America Rayon Converting Plant at Spartanburg, S. C.

to the one quoted at the beginning of this article, why the South may confidently anticipate a continued development in finishing perhaps to overtake and keep apace with its expansion in fabric manufacture.—*Reprinted by permission from October issue of Cotton.*

EXTRACTORIALS

Unquestionably the united desire of the entire industry to do better work, to satisfy the customer's demands, to solve the problems of the industry, to relieve the housekeeper of drudgery, and to do all these things with profit to the industry; to this desire "to please folks" is due the accomplishment of the present time.—*The Starchroom Laundry Journal.*

One of the real accomplishments of the United States at the present time is to cause the rest of the world, in self-defense, to increase the general consuming capacity by the kind of healthy discontent and jealousy that forces out old methods and old rules. —*Canadian Chemistry and Metallurgy.*

We are in a period where wage and working hour adjustments are as much needed in standardization form as new machinery and equipment is needed ever to give mills a fighting chance to live, and the sooner we get down to brass tacks and adopt wage and working hour standards the sooner we are going to get out of the woods and start on a normal money-making basis.—*Fibre and Fabric.*

SPRING 1930 COLORS ANNOUNCED

The Textile Color Card Association of the United States, Inc., has issued a bulletin giving the colors for the spring of 1930. Its report states that the new colors are for the most part of animated tonality, though reflecting a subtlety of cast which distinguishes them from the more brilliant intense hues.

Greens are accorded much style importance, those with a bluish overtone like Bermuda Green being considered especially smart. The yellowish greens such as Sprig will have their place in sportswear. Several new ranges of blue are high-lighted on the card, as this color family is expected to sound a dominant note in the spring mode. Tones of violet or purplish cast are outstanding. The gamme of Cornflower Blue, San Marco and Duomo Blue is of virile tonality, while Dolce Blue, Sorrento Blue and Amalfi Blue are violet-tinted.

Yellows are accented in two important ranges, both possessing considerable depth. The Japanese influence is evident in a group of mellowed golden tones called Formosa Yellow, Nippon Yellow and Imperial Yellow. The last shade is so called because it is the exact tone of the imperial robes worn by the present Emperor of Japan at his coronation ceremony. Butter Yellow and Copa de Oro are in the range of brighter hues. Beiges continue in the fashion picture, but they reflect a decidedly new feeling. Beige Clair and Plage Fleurie have a subtle bisque undertone, while Custard and Baba au Rhum are golden in cast.

"Much stress is placed upon brown for spring," Mrs. Rorke, the managing director, said, "as this range will be combined with lighter tones, such as pink, aquamarine blue, yellow or beige, as one of the smartest interpretations of the bi-color theme."

A very new gamme of browns includes Milk Chocolate and Iris Brown, tones with a hint of purple in their depth. As the vogue for dahlia shades is expected to carry over for spring, two versions of purple are presented, one of more restrained amethyst toning and the other of brighter violet hue with a suggestion of rose. New tones in the orchid range are Wistaria Bloom and Hyacinth.

Rosemist, Cloud Pink and Haze Pink will be especially smart when combined with the new mauvish browns.

While gray does not rank in importance with other color families, a high fashion note is reflected in a range with a mauvish rose aftertone, including George de Pigeon and Iris Grey. Two ranges of red are shown on the card, one slightly bluish in tone and the other a yellowish gamme emphasizing the Spanish theme in such names as Barcelona Red and Toro Red. Suggestive of the picturesque Basque country is a group of rust tones with a soft rose cast, including Cambo and Giroflée. A smart group of animated shades for sports and evening wear high-lights various hues like Violine Pink, Salad Green, Lemon Rind and Lido Blue.

The regular seasonal card will be distributed to members in several weeks.

Sulphonated Oils

By G. W. Priest

WHEN I made my committee report a year ago at Swampscott on a method for the determination of neutral oil in sulphonated castor oil, the work was more or less incomplete and I requested further time for study. Some question has arisen since then concerning what was meant by neutral oil in this particular case. I assumed that, as there was no difficulty in determining the unsaponifiables by the usual methods and that neutral oils other than castor were separable by petrolic ether or by calculation according to our A. L. C. A. methods, the problem of the committee was to work out an accurate method for the determination of neutral oil due to castor oil alone, and if possible one that was reasonably rapid and foolproof.

In order to find a definition of neutral oil in a sulphonated oil, I consulted several oil chemists and we came to the conclusion that the following would be a good one. In using the term neutral fat the A. L. C. A. uses the right term. Neutral fat, then, may be defined as all neutral saponifiable matter which exists in a sulphonated oil. This does not include such materials as ammonia soaps and salts, because the ammonia soaps are already saponified and cannot be classed as saponifiable matter, and the latter are not soaps and the reaction is not one of saponification. In spite of this broad definition we proceeded to study sulphonated oils which we knew contained nothing at the start but pure castor oil.

Most of my business life has been spent in the manufacture of patent leather and the study of chemical problems which are related to it. My experience with castor oil in the plant and laboratory leads me to believe that there is a loose hydroxyl group in the molecule which wanders, often into combinations which are injurious and in the laboratory exceedingly difficult to detect and isolate. After my experience of last year I approached the problem with many misgivings. Before starting on the study I got in touch with several manufacturers of sulphonated castor oil to ascertain what their neutral fat control was, and found the situation to be about as follows: They buy a technically pure castor oil and sulphonate it according to their usual procedure, assuming that they get from 2% to 3% neutral fat in a highly sulphonated oil and 10% to 15% in a less highly sulphonated one. They rarely analyze it for neutral fat on account of the length of time required for the analysis and its complications. They use, when a determination is essential, the method of Lewkowitch, which was suggested by Dr. Bumcke and which I retained as a tentative method until I found something as good or better. One of the members of this committee who is technical director of a large laboratory later corrected his statement about the use of the Lewkowitch method as follows and suggested the trial of a modification of method No. 5 of last year. He writes that "in using petroleum ether rather than sulphuric ether in this determination we are choosing the lesser of two evils. Whereas the petroleum ether will tend to give high results by dissolving some of the soap, we have found that in attempting to make corrections for the soaps dissolved by the sulphuric ether greater losses were involved which brought the results close to those attained by petrolic ether." Below are the two methods:

Modified Method of Lewkowitch.—Ten grams of the sample are dissolved in 50 c.c. of water, 20 c.c. of ammonia and 30 c.c. of glycerine are added, and the mixture is extracted twice with ether, using 100 c.c. for each extraction. The ethereal solution is then washed three times with water to remove small quantities of dissolved soap and the ether evaporated off. The residue is transformed to a small tared beaker, dried at first on the water bath, then at 100° C., and weighed to constant weight.

Petrolic Ether Method.—Weigh 10 grams of sample into a 250-c.c. Erlenmeyer flask. Add 50 to 70 c.c. of alcohol and a few drops of phenolphthalein, then add slowly N/2 NaOH until neutral. Extract three times in a separatory funnel. Wash extract three times with water.

Evaporate and dry with usual precautions. The only other suggestion which I had received was that the ether extract in the Lewkowitch method should be corrected for dissolved soap.

Before sending samples of oil out to the committee for study, I determined to do some work in order to test out further the two methods and in particular the correction for soap included in the ether extract. I had prepared for me by manufacturers of sulphonated castor oils four samples made from pure castor oil, numbered as follows: 215, 216, 243, 244. I had hoped that I might also find some new volatiles or mixtures which might be used successfully for separation of neutral oil, but everything tried failed. Below I quote from our laboratory report:

"We believe that these four oils have been prepared from technically pure castor oil. Judging from the performance of these oils under the two methods in our laboratory alone, we would have been fairly well satisfied. No. 216 gave us the greatest trouble in the separation of the emulsions. However, we succeeded in completing the analysis in about ten days. The other oils gave us little trouble in the extractions, but we found it more or less difficult to wash the extractions with water and get good separations." "Prolonged and careful study of soap in the ether and petroleum ether extract showed that each carried over the same amount, to the extent of about 1%. As we are not sure that this is soap, we have not shown the correction."

At this time it appeared that if a determination of neutral fat was to be made on a sulphonated castor oil

(*Continued on page 755*)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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FIFTY-FIFTH RESEARCH COMMITTEE MEETING

October 18, 1929

THE Fifty-fifth Research Committee Meeting of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., at 2 o'clock, Friday afternoon, October 18, 1929.

The following members were in attendance: L. A. Olney, Chairman, Karl R. Moore, Hans Meyer, Jos. F. X. Harold, Geo. A. Moran, Howard D. Clayton, Wm. C. Smith, Percy Kingsbury, Wm. R. Moorhouse, Wm. H. Cady, Wm. D. Appel, Hugh Christison, Harold W. Leitch, Philip F. Ripley, Walter S. Williams and Walter E. Hadley.

Owing to the absence of the Secretary, Alex. Morrison, Walter E. Hadley was chosen Secretary pro tem.

Prof. Olney reported that the Year Book was progressing as rapidly as could be expected, but doubted if it would be in the members' hands much before the time of the Annual Meeting.

Approximately $500 has been received so far as royalties on the Launder-Ometer. Returns from this source are to be credited to the Research Fund.

Howard D. Clayton, Chairman of Sub-Committee on Standard Methods for Testing Shrinkage, reported that his committee was being organized at the present time, and expected to make a tentative report relative to method for testing shrinkage at the next meeting of the Research Committee.

Wm. D. Appel, chairman of the Sub-Committee on Survey of the Textile Industry for Possible Research Subjects, reported progress.

Owing to the absence of Geo. R. Lockhart, Chairman of the Sub-Committee on Rayon, it was felt that nothing should be done regarding definite formation of this committee until he could be consulted. It was agreed, however, that the personnel of the committee should include at least one member representing each of the four typical rayon producers, namely, Viscose, Cupro Ammonium, Nitro and Acetate rayon, and at least two members from textile concerns extensively interested in rayon dyeing and finishing.

The question of method of appointing members of the Research Committee was discussed, and it was suggested that the Council be asked to authorize the method which

has been in use for some time, namely, direct appointment by the Chairman.

Wm. H. Cady, Chairman of the Sub-Committee on Light Fastness, reported that three lines of work were under way in regard to fading lamps. The question of the possibility of making an improvement in the present fading lamp was discussed, but up to date various alterations have not shown any definite improvement. The opinion was expressed that the Association should secure a Fugit-Ometer in order to carry out comparative trials between the Fade-Ometer and sunlight. The committee are still searching for dyes which can be satisfactorily used for standards for cotton, wool and silk. Progress was reported along this line.

Geo. A. Moran, Chairman of the Sub-Committee on Dyed Cotton reported progress.

Hugh Christison, Chairman of the Sub-Committee on Dyed Wool, reported that Wm. C. Smith was conducting a series of experiments in relation to fulling. Considerable discussion followed regarding the proper type of container for fulling samples, and Mr. Christison felt that trials should be made to determine the action of bulged tops and bottoms, and semi-spherical sides. It was decided that a practical trial alone would determine what shape would be best. The committee was instructed to consider the matter of Allegheny metal, copper, brass and Monel metal for such containers.

Dr. Jos. F. X. Harold, Chairman of the Sub-Committee on Water-Proofed Textiles, reported that there was nothing further to add at present to the report which appeared in the Proceedings of the August 5, 1929, issue.

Prof. Olney reported for the Sub-Committee on Bibliography of Textile Chemistry, Bleaching, Dyeing and Finishing, and the Sub-Committee on Methods of Determining Sizing Materials, and the Sub-Committee on Rubberized Textiles, Chairmen of which were unable to be present.

A letter was read from Dr. Rupp, Chairman of the latter committee, and considerable discussion took place as to the copper content in textiles. Wm. C. Smith is to co-operate with Dr. Rupp in connection with his work.

Attention was called to the fact that there were 350 bound sets of the three Light Fastness Reports so far published, which are available at the office of the Secretary. It was decided to charge $1.00 per set delivered on all future sales.

The possibility of forming a Sub-Committee on Methods of Determining Acidity and Alkalinity of Textile Materials was discussed. It was stated that the determination of acidity and alkalinity in textile material while appearing quite simple was really a complicated matter. Three different methods were suggested: (1) the application of pH determination; (2) the use of indicators, and (3) the determination of tensile strength after the material had been heated, say, to 400° F. Mr. Clayton described a method which he used involving the use of an electrically heated and controlled flat iron, on which cloth was exposed for a definite number of seconds at a definite temperature. If alkali is present, the cloth develops a slight brown color; if acid is present the tensile strength is greatly reduced.

The meeting adjourned at 5.30.

W. E. Hadley, *Secretary pro tem.*

NORTHERN NEW ENGLAND SECTION

THE Northern New England Section met at Riverbank Court Hotel in Cambridge on Saturday, October 19. Twenty-five were present at dinner and about thirty-five at the meeting.

Walter H. Zillessen's moving pictures of the outing proved so successful that the Section hopes to make such an exhibition an annual affair with additions to the collection each year. Mr. Zillessen showed also slow moving pictures of Bobby Jones's golf.

Dr. Harold C. Chapin spoke on "Electrical Control of Chemical Concentrations," showing latern slides, apparatus, and experiments to illustrate application of conductivity measurements to control of acid, alkali, and salt, concentrations, and the application of voltage measurements to pH control in weak acid and alkali solutions.

Automatic instruments for recording and continuously adjusting concentrations are now beyond the experimental stage, and in many textile processes have proved successful both in economizing chemicals and in guarding uniformity of product. Among processes now under such automatic control are worsted and wool carbonizing by sulphuric acid, neutralization of caustic in mercerized cotton, soda kier boiling, acid treatment preliminary to kier boiling, and neutralization of water supply.

NEW YORK SECTION

THE dinner and October meeting of the New York Section of the American Association of Textile Chemists and Colorists was held on Friday evening, October 25, at the Hotel Alexander, Hamilton, Paterson, N. J.

P. F. Kingsbury presided. After the regular business had been attended to, P. J. Wood, Vice-President of the National Association, was introduced as the speaker of the evening. After a few preliminary remarks in which he told of his experiences in Spain in the summer, he delivered an address entitled "Textile Printing in Spain." Sixty members were present.

An abstract of Mr. Wood's talk follows:

Textile Printing in Spain

The textile printing business in Spain is conducted mainly to supply the home trade and covers the requirements of 42,000,000 people in Spain, as regards the low-priced and medium-priced prints on cotton and rayon. A little very high-class work is imported, but not in any considerable yardage.

The four print works visited consisted of very old buildings and machinery with the exception of mercerizing machinery, which was quite modern, and some new printing machines.

The technical part of the work is mainly in the hands of Alsatian chemists in these particular mills.

The engraving is mostly done by mill, and in this type of work the Spaniards do as good work as is done by any other nation. The mills are imported from England, France or Germany. There is a certain amount of pantograph work, and this is done in Barcelona.

All the modern colors are used in Spain, particularly those giving fast print colors on the fabric, as it is a country of sunshine and the climate is very hard on colors. The colors being used are Naphthol colors, rapid fast colors, and vat colors, for the fast color work which comprises the greater part of all printing done. These colors are very cleverly used, and beautiful effects are obtained.

A certain amount of fugitive work is done, but mainly multi-color work on fabrics destined for use as kimonos and bathrobes.

Very little silk is printed in Spain. Almost none on printing machines, with the exception of a few Tussahs.

Crepe de Chines and other all-silk goods are printed practically altogether by the screen method.

RHODE ISLAND SECTION

THE October meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists was held on Friday evening, October 25, at the rooms of the Providence Engineering Society.

Richard B. Earle, chairman, presided.

Dr. M. L. Crossley, who is the chief technical director of the Calco Chemical Company, Inc., delivered an address entitled "The Effect of Isomerism on Color."

Thirty-five members were present.

PLANS FOR THE ANNUAL MEETING AT PHILADELPHIA

OUR annual meetings for the last several years have been far too crowded and consequently somewhat rushed for us to get the best out of them, either technically or socially. It is planned this year to depart quite substantially from the method of procedure followed in the past. As this is a subject of great interest to our entire membership, the new plan is outlined well in advance of the meeting.

We propose to receive papers from all of our members who may be willing to present them. We shall also, if possible, secure some speakers from without our own immediate membership. Abstracts of all of the papers under consideration will be made and printed. These will be sent to the entire membership in advance of the meeting, the idea being that the members can pick out those subjects in which they are personally interested, and by a careful reading of the abstract they can be themselves prepared for an intelligent discussion of the subject matter at the time of the meeting.

Conduct of the Sessions

Friday evening will be devoted to a more or less social gathering of the members, but with opportunity for such informal open forum discussions as may seem interesting and advisable. The Saturday meetings will be devoted in the first place to a business meeting of the Association to which a little more time can be given than heretofore. In connection either with the business meeting of the Association or else in the course of the day's session, there will be a presentation by the President of the Association of the whole subject of research which has been under discussion for several years. This will afford plenty of opportunity for a full discussion by all of our members. Next a presentation of a selected number of subjects which in the opinion of the Council will hold the greatest interest for the entire membership. Probably during the day sessions there will not be presented more than four or six subjects, but adequate time will be allotted for their full discussion, and any remaining time will be devoted to whatever discussion may be offered in connection with the abstracts of papers not presented orally during the course of the meeting.

All of the papers submitted, without exception, will be printed in the proceedings, whether they were presented orally during the course of the annual meeting or not.

Several objects may be attained through this last proceeding. In the first place a greater number of papers can be handled and discussed, and in the second place there may be a greater willingness on the part of some of our members to write papers if they know that they will not themselves be required to make an oral presentation of the subject.

One more procedure will be followed and this is that we will list in the proceedings prior to the meeting all of the suggested subjects for discussion on which no papers have been presented. In this way various members reading these suggested subjects will have opportunity to collect any thoughts that they may wish to present on the suggested subjects.

Applicants for Membership

Active Membership

Boozer, John W., superintendent of bleachery, Mercerizing and Finishing Plant, Halifax Cotton Mills, Inc., South Boston, Va. Sponsors: J. D. Sanddridge and D. C. Newman.

Entwistle, James W., Hartsville Print & Dye Works, Hartsville, S. C. Sponsors: S. L. Hayes and Thomas W. Pickup.

Heath, Roger A., assistant print manager, Passaic Print Works, Passaic, N. J. Sponsors: Carl H. Brubaker and P. F. Kingsbury.

Hirn, John E., demonstrating salesman, National Aniline & Chemical Company, 40 Rector Street, New York, N. Y. Sponsors: Charles C. Knights and William A. Holst, Jr.

Kirkpatrick, Jr., Joseph, chemist, Passaic Print Works, Passaic, N. J. Sponsors: Carl H. Brubaker and P. F. Kingsbury.

Korpanty, Edward J., dyestuff chemist, Sandoz Chemical Works, Inc., 708 Washington St., New York, N. Y. Sponsors: James C. Walker and W. W. Hales.

McDaid, Arthur S., dyer, Southern Worsted Corporation, Greenville, S. C. Sponsors: D. S. Moss and John H. Batemen.

Quern, D. Stewart, bleaching chemist, Buffalo Electro-Chemical Company, Station B, Buffalo, N. Y. Sponsors: Thomas A. Marlowe and A. R. Thompson, Jr.

Sims, Joseph, finisher, Hartsville Print & Dye Works, Hartsville, S. C. Sponsors: S. L. Hayes and Thomas W. Pickup.

Smith, Max W., chemist, Wayland-Lloyd Company, 274 Washington Street, Providence, R. I. Sponsors: Karl R. Moore and John M. Hood.

Stuart, Charles R., superintendent, William Knowlton & Sons Company, West Upton, Mass. Sponsors: H. G. Smolens and Alex. Morrison.

Warburton, George A., master dyer, Waite Carpet Company, 556 Mt. Vernon St., Oshkosh, Wis. Sponsors: C. B. Fieldhouse and A. T. Brainerd.

Junior Membership

Kingsbury, Carl O., assistant manager, New England branch, Solvay Sales Corporation, 77 Summer Street, Boston, Mass. Sponsors: Woodward Allen and George Stewart.

Muller, Albert, assistant vat dyer, Umans Brothers, 1555 Boston Road, Bronx, N. Y. Sponsors: Frank R. Christ and Ormand W. Clark.

Notice

The Secretary would like the present addresses of the members whose names and last known addresses appear below:

Bader, John, 293 Chestnut Street, Nutley, N. J.

Frazee, M. D., Box 274, Nashua, N. H.

Pennock, Wm. W., Amoskeag Manufacturing Company, Manchester, N. H.

Photis, Christos J., 466 W. Twenty-third Street, New York City, N. Y.

Schoffstall, Chas. W., 821 Forest Ave., Evanston, Ill.

Williams, S. H., care of General Dyestuff Corporation, Chattanooga, Tenn.

A Hearty Welcome Awaits You

at the

Annual Meeting of the American Association of Textile Chemists and Colorists

The Bellevue-Stratford, in Philadelphia

December 6th and 7th, 1929

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
Professor of Chemistry and Dyeing, Lowell Textile School
Directing Editor

WILLIAM HOWES COLLINS
Managing Editor

MYRON DREW REESER
Advertising Manager

Published biweekly by
HOWES PUBLISHING CO., INC.
90 William Street, New York City

A. P. HOWES, President E. S. PREDMORE, Secretary

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00

Vol. XVIII November 11, 1929 No. 19

LABELS FOR COLOR FASTNESS

THE chemistry of textile processing has in recent years become a decisive factor in solving the merchandising problems of the textile industry. Department stores have been quick to perceive this development and have responded by setting up testing laboratories and studying dyes and the processes of dyeing and weighting. They have learned that the selling of silk fabrics, cotton materials or finished rayon garments is often complicated by complaints based on the fastness of the goods or, in the case of silk, on the amount of weighting.

In this way the textile merchant's problems are entwined with the problems of the chemist, the dyer and the research worker, all of whom are seeking to standardize fastness and processes like weighting.

Now the proposal has been advanced that silks be labeled with tickets stating the amount of weighting or finishing content. The Silk Association of America has requested its sub-committee on weighting to recommend a formal method of labeling. How very encouraging such a move is can best be appreciated by those technical groups which have striven so hard to reduce color fastness to standards that can be designated by symbols—symbols which, in turn, may be used in labeling fabrics. Both weighting and color fastness are qualities added to a fabric by processing, and consequently the problem of standardizing one is no different from the problem of standardizing the other.

If the movement to ticket silks for their weighting content is successful, then the much broader project of labeling all yarns, fabrics and garments for their fastness to light, washing and other agencies should gain greater attention among mill men than so far it has attracted. Those trade and technical groups which are working out fastness tests should not only watch the progress of this weighting ticket plan but should also be ready to open a strong campaign for labels that will carry definite fastness symbols, instead of the usual meaningless "guarantee." Perhaps the same label can be used for both weighting content and fastness standard.

When the textile industry finally adopts a method of designating the fastness of its merchandise, that day will see a wider recognition of applied research, and possibly a few converts from the ranks of scoffers who believe that nothing practical ever comes of laboratory study. What could bring greater profit to the entire textile industry than a public faith in the color fastness of garments and fabrics, a faith resting upon standards of fastness truthfully designated upon a label, and known publicly as the result of laboratory research?

THE "FAST-TO-LIGHT BRIGADE"

WHILE on the subject of fastness standards and guarantees we should like to quote a paragraph from a recent article in a British paper, Textile Argus, regarding the public demand for fast goods. Says this paper:

> Wherever the individual opinion anent the "fadeless" guarantee, whether or not one thinks "someone has blundered," the charge of the "fast-to-light brigade" is in full action, be the decision what it may.

The analogy is well expressed and could be carried farther if it were not for certain differences between the poem alluded to and conditions as they stand in the real world of retail shops and guarantees. The charging "fast-to-light brigade" is obviously the public clamoring for fadeless curtains and gingham gowns. But it is not the public which shall ride "into the valley of death" if their demand is not satisfied. The six hundred (or more) cheap and unprogressive mills that refuse to use on so-called "guaranteed" fabrics the vat dyes which give to the guarantee the truth demanded by the public, eventually shall ride down into the valley of complete oblivion. For the trend toward vat colors is gaining momentum every day, and trade-marked fabrics with established reputations for fastness are winning the battle. The public's "fast-to-light brigade" has shown the willingness to stand the charge of a few cents more for goods which will keep their colors through long light exposure. In the end it is their choice of proven trade-marked fabrics which will defeat the dwindling army of backward mills that use cheap dyes and cheap prices as weapons of trade.

MORE ANENT SHADE CARDS

IN further comment on the question of the issuance of shade cards by American dyestuff manufacturers, we are glad to publish the appended letter from Mr. Selisch:

Monticello, Ind., November 2, 1929.

Editor, AMERICAN DYESTUFF REPORTER,
New York City, N. Y.

My Dear Editor: There recently appeared in the AMERICAN DYESTUFF REPORTER an editorial, "Why Not More Shade Cards?" and in the last edition of the AMERICAN DYESTUFF REPORTER of October 28, 1929, there was printed a letter congratulating the editor upon this editorial.

This letter was signed by the purchasing agent of one of the largest dyers and finishers in this country, and because of this fact that this firm is the largest of its kind the letter should really carry some weight.

However, I am sorry to state that this letter left with me no impression at all, unless it be a very bad taste regarding the manner in which the editor handled this matter, or else it be because it gives me undeniable evidence that the manufacturer still looks upon his dyer as a common ordinary workman, instead of rating him with the scientist of to-day.

The modern, progressive dyer of to-day is, or should be, a scientist. His work is a science in the truest sense of the word. The application of vat color types, as well as naphthols, is a science, and—who would deny it?

The dyer is without question the man who is held responsible for the quality of his work, and in this and in the performance of his varied duties no purchasing agent is able to help him, nor advise him intelligently, for the simple reason that the purchasing agent is not a dyer.

May I ask you, my dear editor, what can the purchasing agent possibly know about the product which the dyer must apply on to the fibers? Just to what extent is the purchasing agent interested in the work and the duties of the dyer? To no extent at all. He does not understand the scientific application of dyestuffs, nor does he know or understand the value of a dyestuff, and last, but not least, does he realize just how infinitely delicate a process the application of a dyestuff upon the fiber really is.

The purchasing agent buys a dyestuff not because of quality, but because of price, and the dyer is the goat.

Let us, for instance, select the intricate art of applying vat color types. Is there a dyeing process to-day which is more scientific than this process, unless it be the application of naphthols? Is there a purchasing agent who is able to intelligently advise the dyer, who, it must be remembered, is solely responsible for the quality of his work? If there is, I have not seen him.

Is there a purchasing agent who is able to buy a vat color intelligently? By that I mean is he able to select the type of vat color which will give the dyer the desired results? I am certain that there is not.

Then, please answer this question: Why in the name of big apples and little fish should a purchasing agent be interested in shade cards?

And by the way, please ask this purchasing agent, who so prominently figures in this letter in question, whether or not he has had a glimpse of the new shade card just issued by the Newport Chemical Works? If he hasn't, and it is evident from his letter that he hasn't, I can tell him that he has missed something.

This shade card depicts the line of vat colors manufactured by the Newport Chemical Works, and compares very favorably with the editions of shade cards by European manufacturers.

On the whole, though, my dear editor, I must agree with you—we certainly need more and better shade cards depicting the American made dyestuffs.

Incidentally, may I ask you to please feature the modern progressive dyer a little more—he certainly needs the publicity—and I am certain he deserves it.

I thank you.

Very truly yours,

M. A. R. SELISCH,
Superintendent of Dyeing.
Thread Mills Co. (Marshall Field & Co.)

There is undoubtedly a great deal of truth in much that Mr. Selisch says regarding the functions of the average purchasing agent. There are fortunately, however, a certain number of purchasing agents who are graduates from the departments of dyeing or textile chemistry who are therefore really well qualified to take a practical interest in the dyestuffs or other chemicals which they may be called upon to buy.

In general, however, we must admit that the purchasing agent is the last man in the world who should be entrusted with the determination of what types of dyestuffs should be bought for his mill and, as a matter of fact, very few purchasing agents of our acquaintance exercise any such authority.

We agree with Mr. Selisch one hundred per cent that the dyer is an artist and a scientist, and that the exercise of his profession calls for a combination of faculties amounting almost to genius, and we feel very confident that if Mr. Selisch has followed the editorial contents of the REPORTER from time to time he has not failed to observe that the dyer is held by us in this very high esteem.

With regard to the publicity accorded the issuance of new shade cards by the trade press generally, it might just as well be called to the reader's attention that editorial comment is to a very large extent based upon information regarding the cards written by their producers and

which generally accompanies the cards when received by the editor.

It is quite obvious that the editor of a publication who receives a shade card unaccompanied by descriptive matter from its producer cannot be expected to expound in any great detail upon the characteristics of the colors illustrated lest, perchance, he be guilty of giving out false information. If, on the other hand, a well-prepared description of the card accompanies it, the editor can use the facts contained therein in rewriting a very readable story.

The REPORTER feels that it is probably because of this fact that there appears to be such a great predominance of news items regarding shade cards issued by foreign manufacturers, for, with perhaps a single exception, the publicity departments of the domestic manufacturers do not take it upon themselves to keep the trade press fully informed as to what they may be doing in the way of shade card production.

EDITORIAL CORRECTION

OUR attention has been called to the fact that under the caption, "A Tribute to American Chemicals," an editorial published in the September 16 issue of the REPORTER, some facts were given which might have been subject to an erroneous interpretation by one not thoroughly familiar with the relative status of the dyestuff manufacturing industries of Germany and the United States.

It was mentioned in this editorial, among other matters, that "Germany stands as the largest single market for our coal-tar products." Unfortunately, this remark was not elaborated upon and it is barely possible that some uninformed person might have conceived that manufactured dyestuffs constituted some considerable percentage of the coal-tar products mentioned. As a matter of fact the value of one single item—benzol—which comes about as near to being a raw material as one can get in the coal-tar chemical industry, constituted about $3,000,000 worth of exports to Germany during the year 1927, which is the last for which figures are available. All other coal-tar derivatives, including dyes and stains, exported to Germany in that year had a value of less than $80,000.

We do not imagine that anyone was really deceived by our former editorial, but as there is a possibility of such deception, we take this opportunity to make the above correction.

J. Takamine, Jr., president of the Takamine Laboratory, Inc., Clifton, N. J., is attending the World Engineering Congress in Japan as official delegate of the American Chemical Society. Mr. Takamine sailed on the steamship *Korea Maru*, and after the sessions of the congress have closed, will spend several weeks additional in Tokio attending to the vast interests of the Takamine organization.

OBSOLETE CHEMICAL EQUIPMENT

There is too much obsolete chemical equipment doing duty to-day—equipment that should be scrapped.

Most of our automobiles are junked as soon as they are out of date. They may not even be obsolete when they are discarded. We just don't like the "looks" of them and buy a new one.

Why do we persist in operating obsolete equipment in our industries and at the same time persist in demanding strictly up-to-date pleasure equipment? To scrap obsolete industrial machinery *pays*, while the purchasing of new machinery every year to play with does *not* pay.

All of which raises the question, "When does a thing become obsolete?" So far as I know, there is no rule or formula that positively answers this very important question. It is not easy to write a rule or formula that is applicable to everything.

It may be that you, as an automobile owner, declare that your car becomes obsolete in one year, and therefore you annually trade it in for a new one. But the "old" car still continues to run for a number of years in the hands of subsequent owners. Whether or not your automobile is really obsolete is therefore largely your own whim.

I know of steam power plants in which ten-year-old engines or turbines have been "junked" and replaced by more efficient and more economical apparatus. The selfsame equipment in other less progressive power plants would have been kept another ten years or more.

You and I have our own ideas about obsolete clothes and when they should be replaced. The average man "wears out" one straw hat and one felt hat each year. Women "wear out" hats more rapidly than men. Some people use lead pencils until they are "stubs." Others discard them as soon as they are inconveniently short. And so on.

But let us get down to brass tacks. What we are looking for is a good rule or formula. My own answer to the question is this: A thing is obsolete as soon as it is found that it will *pay* to replace it.

Sometimes it pays to throw out machines that are new. I was once employed by a concern that manufactured a decidedly inefficient machine. I didn't know it was inefficient and uneconomical at the time or I would not have worked for them. They were in business for three years, and then were forced to quit because nobody would buy. Many of their machines were replaced inside of a year because they actually were obsolete before they were installed. They were "new," yes, but obsolete nevertheless because it paid the purchasers to install something better immediately.

Simply because we can "get along" with an old machine, part or thing is no proof that it is not already obsolete. My contention is that entirely too much machinery is in daily use that should be in the scrap heap. It should be replaced because it will *pay* to replace it.—*W. F. Schaphorst, M.E.*

The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narrative is one of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER, *90 William Street, New York City.*]

DYEING IN THE YEAR 1889

SOME TIME ago, in answer to a request from Mr. Schoffield, I promised to give an account of how the dyers of forty years ago did their dyeing compared with the methods of to-day, but the fishing season and a little rebellion I had to stage to persuade my employer that I was not yet old enough to be put on the shelf left me little time to do it any sooner. Now that all that is over, I want to make good my promise and start the ball rolling in the hope some other old codger like myself in the dyeing field will come out after reading this and tell how much behind the time we were in those days when communications were so slow and dyeing methods kept so secret no one knew how the others did their work.

To begin with, let me tell you that a dyer's position was no bed of roses. All the work was done by hand; no washing machine; very few extractors; dyeing machines as we know them to-day were nowhere in existence; dyestuffs were few; dyeing was mostly done with the products of the three natural kingdoms—animal, vegetable and mineral; and the dyer had to know not only how to use them but also how to prepare them from their natural state.

DYEING SILK BLACK

Having flunked in grammar and mathematics two years in succession, father told me I had better quit school and select a trade, so I decided to learn to be a dyer and follow in the footsteps of an uncle who, as dyer, was constantly trotting around the globe following his profession as an expert.

My first job was in a dyehouse where they made a specialty of dyeing black on silk and cotton yarn. In this place they had an old washing machine that was used mostly for washing goods coming from the nitrate of iron bath. Most other washings were carried in a boat and washed in the lake by hand. Lots were about 200 pounds each. The washing crew was nine or eleven men—one paddled the boat; four or five at each side of the flat boat did the washing, while the paddler propelled the boat slowly up the lake during one washing and back while rinsing. It was quite an adventure for me when they allowed me to go in place of someone else, except in the winter time, when we had to take along pails of boiling water to keep from freezing.

The silk was degummed on sticks in a bath made up of 30% of olive oil soap at the boil. The bath heated with a close copper coil, and the bath kept simmering during the whole operation, which lasted one and a half hours, then rinsed in a warm water with a little sal soda and hydroextracted. It was then ready for the red iron, as the nitrate of iron was called. The silk was worked in this bath, kept at about 35° Bé., for one hour, squeezed out, washed and then given a warm water, extracted and put back in the iron bath. According to the weight desired, one to five passes in the iron bath were given. When more than three passes were necessary, silk was treated with a boiling soap for five turns, after the second and subsequent passes. When the iron processing was completed, the goods were first soaped in an old soap bath, then whizzed and dressed at the post, where the skeins were rolled up in handfuls and tied in bundles ten handfuls to a string and five bundles to a stack, carefully spread and sewn in it. They were then boiled for two hours in an open vat with 40% to 50% of soap and carefully poled. When the silk came out of this soap it was a beautiful deep burnt orange in color.

After this the silk was rinsed and whizzed, and put through a bath of 12% yellow prussiate of potash and 12% muriatic acid, which turned it a deep Prussian Blue. Again rinsed and whizzed, and it was ready for the gambier and tin salt bath.

This bath was made up with 200 pounds gambier previously boiled until dissolved, let stand for a while, the solution strained into the vat and the lot entered. Seven turns slowly in this bath turned the silk a dark green. It was then raised and 10% to 20% of tin salt was added and the temperature raised to 70° C., and for the rest of the day it was worked in this bath until cold, the goods washed thoroughly and put in another 100% bath of gambier.

This bath was always kept and reinforced for every succeeding lot with the full amount of fresh gambier. The goods coming from this bath were washed and made ready to be dyed black with logwood and soap. The logwood in chips was boiled in water in a vat, and from there the liquor was carried in pails to the dyeing vat. It was a tiresome job and the unskilled helpers were assigned to this job of carrying the logwood liquor with pails. The writer was assigned to it, and after a while, feeling that he was getting knock-kneed from the weight of the pail, he rebelled and threatened to quit if he was not relieved of that job,

to the great amusement of the other workers. The result of this rebellion, however, was that the boss installed a pipe line with a funnel at the starting point, and now one man could pour the logwood liquor in the funnel and through the pipe it was carried where it was needed, relieving a number of men for other duties.

According to the shade of black desired, the silk was dyed in this logwood and soap bath and finished or it was processed further; either way, the silk was entered at 45° C., given five turns, the temperature raised to 60° C. for another five turns and raised to 80° C.; then if it was to be finished, one skein was washed and dried to match it with the sample. Sometimes raising the temperature again to 80° C. or an addition of fresh logwood and soap, and also sometimes an addition of fuchsine in the finishing bath to cover up a too greenish tone of black, was necessary to obtain a good match. The silk was washed after the logwood and finished in a scrooping bath with 5% lemon juice, 2% olive oil previously boiled with 2% soda ash, and for tram 1% to 2% glue dissolved in boiling water.

When the black had to be treated further, as for double or triple blacks, the silk coming from the first logwood bath was washed and put into a bath of pyrolignite of iron for one hour, washed, and into a bath of weak gambier and again washed. For double black it was then given another logwood and soap bath. If for triple black the silk was given a lukewarm bath made up of one-half logwood and one-half water, turned in this bath eight or nine times, and a second time in the pyrolignite of iron bath, after which it was washed and passed in the weak gambier bath for one hour.

The silk was finally dyed in a bath of logwood with 80% soap, starting at 50° C., and every five turns the temperature was raised to 55, 60, 65, 70 and 75°, starting to match at 60° until the desired match of an extra bluish black was obtained. The dyed lot was then washed and scrooped and for the other blacks.

Weighting and Dyeing of Blue

After serving two years in that first shop I decided I had learned all that could be learned there and found work in another place where they did all kinds of dyeing. As apprentice to those master dyers for five years I saw the passing of the natural dyes and the introduction of the coal-tar colors.

They were greeted with immediate favor, but at first they were used in connection with the old vegetable mineral and animal dyes. For instance, most dark shades like brown, olive, green, maroon, were first given a bottom of tumeric and then dyed in a broken soap bath with basic or acid dyes, the first dyes that came to our attention. The tumeric was soaked in warm water with some sal soda for some time, then boiled and left to settle and the clear yellow liquor decanted for use. Several colors were bottomed at the same time and then each color dyed separately, the shade wanted. Many shades of blue were first given a bottom of Basic Blue in an acidified broken soap bath, or in a fresh soap with Nikolson Blue (Alkali Blue) and then toned to shade in an acidified bath with our vegetable dyes or with cochineal. This was a dye obtained from a fly, much used in those days on different mordants to obtain reds of several shades. To use it in toning it was prepared by soaking the flies in a solution of ammonia for three or four days and then boiling it until the ammonia had evaporated and the remaining paste dried and kept until needed. It was then dissolved in boiling water and strained ready to use.

In this dyehouse they made a specialty of dyeing a deep shade of blue on silk, the like of which I have never seen in any other place. The silk was boiled off and given two or three passes in nitrate of iron, same as if it was to be dyed black. Boiled in a strong soap bath and given the Prussian Blue with 8% yellow Prussiate of potash and 8% muriatic acid, then rinsed and whizzed. The next bath was made up with broken soap and acetic acid and the silk dyed in this bath with basic pure blue. This was the bottom and was finally topped in a fresh soap bath with a little logwood to give it the desired shade. Facing it it looked black but it had a very clear, beautiful navy undertone and weighed from 10 to 20% more than pure silk.

The Weighting of Silk

As will be seen the loading of silk was carried on even at that time quite successfully on black silk. The weighting was from 10 to 60% above the natural pure silk and was easily obtained with the iron liquor, tin salt and gambier. The color dyeings were also loaded 10 to 20% with sumac, tannic acid, gallnut, and for light shades and white with sugar and glucose. Souple silk was loaded to even a greater extent in the same manner as for colors and for blacks with Divi-dive, Myrobolan, chestnut extract and anything that would yield any amount of tannic acid substance was pressed into service.

At this time the first attempts to load silk with bychloride of tin were also made. At first the weighting was done on the raw silk. It was wetted out in a weak solution of muriatic acid, whizzed and immersed in the tin for an hour, washed and put through a warm soda bath, washed again and given as many passes of tin and soda as wanted, then boiled off as usual for the pure silk, but it was necessary to preserve the best soap for dyeing with the few basic and acid dyes we had at that time and if the silk was loaded in the gum the boil-off soap was no longer fit to use. Also a good deal of the weight was lost in the boiling off, so it was found more convenient and profitable to do the loading on the boiled-off silk. Then someone found that the tin was better fixed on the fiber if the silk was passed in a solution of phosphate and that a bath of silicate of soda would make it look

brighter and the process of weighting with the tin-phosphate-silicate came into use.

The first attempts to weigh the blacks with tin are quite interesting. For a time it was a question whether to let the tin precede the iron or vice versa. Some dyer loaded the silk in the gum and after boiling it off proceded to give it the iron baths; some others went as far as the blueing first and gave the tin weighting before the gambier. Then someone found a way to utilize the tannin in the unoxidized logwood extract and gave the silk the required amount of loading at the same time that it was dyed by first giving it three passes in the tin and phosphate and eliminating the silicate, also the gambier and the tin salt and using Methylene Blue, Methylene Green and Chrysoidine to bring up the shade of black wanted, and this is the process used in most dyehouses at present doing the loading and dyeing in two days where it took from five to six days before.

The first silk loaded with tin surely gave us a lot of trouble in dyeing it in those days. We had yet a number of natural dyes that we still used. Brazil wood, ebony wood, catechu and many others that we used on pure silk would make a mess when applied to weighted silk. The tannin which more or less contaminated those wood dyes would stain and dye uneven and could not be used. not even for shading purposes and not all the coal tar colors were fit to use for level dyeing, and as the tin loading was taking a firm hold a search for the proper dyestuffs was every dyer's business. But after a few failures and a better understanding of how to do the loading with the new chemicals the dyers soon came to overcome the difficulties and accept the new situation as a necessary evil.

Progress in Dyeing Methods

Looking back on those early days when I used to take an armful of silk and follow the crew to the boat to wash it, I call still smile at the pranks we used to play on the old paddler, the propeller of the boat. The washing concluded and everybody tired and glad to rest on the way to the shore I would wink to some youngster in the crew, and together silently slip into the water and swim part of the way back, and the paddler would swear he would leave us to drown and quit his job rather than go out with such imps and wildcats who did not know how to behave in working hours. And for working hours we had plenty. We started at six in the morning in the summer, at seven in winter, but we did not know the time we would stop at night. We worked until some particular phase of the processing was done. Sometimes it was six at night; more often it was eight or nine, or later. The boss would serve us a lunch and we could work until we dropped in our tracks from exhaustion.

Compare that Brother Sheffield to our eight or nine hours a day work of to-day. Machines we had but few. Skein dyeing was all done by hand. Piece work there was very little. Some cotton pieces woven or knitted were dyed with a hand reel and taken to a stream to wash it in the current. Direct cotton dyes were yet to be produced, and dyeings were done with a hand reel in several stages with infinite pains and labor. To dye a lot of black cloth it took all of two days. It was first boiled with soda ash for a couple of hours and then washed. Then it was put into a bath of logwood and fustic, and turned back and forth with the hand reel for the rest of the day. The next day it was saddened in a bath of copperas and bluestone and then put back in the logwood bath to which some soda ash had been added, and worked there until the boss decided it was black enough. It was then brought to the stream andd holding it by one end let the water run over it, changing ends several times until there was no more color washing out from it. Brought back to the dyehouse it was finally softened in an emulsion of some kind of grease saponified with soda. Soap was too expensive for that kind of work. Working in a dyehouse in those days surely was a man's job and at the wages paid in those days!

We surely hailed the arrivals of the direct dyes with delight, but when the first jig was put up! Oh, boy! And then someone showed us how to dye black with an oxidizing machine, a succession of vats and chambers where a piece could be put in on one end and come out the other end finished, and we thought that the dyer had become effeminate. No more manual hard work to perform, skein dyeing machines, yarns dyed on tubes, spools and beams; no more hand reels; no more turning hanks by hand; no more wringing; doing in a couple of hours what took days of strenuous work to perform. That is the progress made in dyeings. That is the difference between dyeing as done to-day compared with dyeing in 1889.

COLLOID CHEMICAL RESEARCH BUREAU IS ESTABLISHED AT ZURICH

A chemical research bureau, with American participation, has been established in Zurich, Switzerland, under the name of the Colloid Chemical Research, Inc. The purpose, says Commercial Attaché Charles E. Lyon, Berne, is not only to conduct chemical research, especially in the colloid chemical field, but also to acquire patents and processes for commercial development and to erect laboratories in Switzerland and abroad.

Miss Vernette B. Moore will be engaged in organizing and outlining the courses taught in the Textile Department, Clemson College (S. C.), in co-operation with the instructors in the various subjects. Miss Moore is a graduate of Northwestern University and received her master's degree at the University of Iowa. The organization and correlation of the textile courses, according to modern educational methods, will probably be completed by the close of the coming year.

New Method for the Determination of Neutral Fat in Sulphonated Oils

By Ralph Hart

IN a paper by the writer on the "Determination of Neutral Fat in Sulphonated (Sulphated) Oils"[1] it was suggested that, instead of finding the neutral fat gravimetrically, the determination of the saponification number corresponding to the neutral fat might be sufficient. Since then Nishizawa and Winkuti[2] have investigated the effect of alkali on sulphonated oils and find that boiling for five hours with 1.0N alcoholic caustic has only a negligible effect on the sulphate radical. Hence, saponification tests on sulphonated oils may be carried out without fear of interference from the organically combined sulphate group. Herbig[3] also has made saponification tests on the neutral fat extracted from sulphonated castor oil by means of cold acetone—a method developed by himself.

While the present A. L. C. A. method for the analysis of sulphonated oils is quite complete, it would seem desirable to include the saponification test outlined below, which by calculation would furnish the following additional information: (1) The saponification value of total fatty matter—useful in identifying the origin of the sample; (2) saponification equivalent of neutral fat; and (3) the approximate percentage of neutral fat.

In this discussion the following terms will be employed:

1. "Fatty Matter": Animal or vegetable oils, fats and waxes which react with alkali.
2. "Unsaponifiable Oil or Grease: Mineral oil and waxes not affected by alkali.
3. "Oil or Grease": A mixture of the first two, or fat of unknown composition.

There will also be made the following distinction between the different saponification data:

1. "Saponification Figure (F)" will refer to the mg. KOH required to saponify the total oil, or any of its components, in 1 gram of the original sample.
2. "Saponification Value (V)" will indicate the mg. KOH required to saponify 1 gram of the water-free total oil, or any of its components.
3. "Saponification Number (N)" will refer to the mg. KOH required to saponify any component contained in 1 gram of total fatty matter.

Thus, the neutral fat in a sample composed of 50% total fatty matter containing 20% (based on the sample) neutral fat, 1 gram of the latter requiring 190 mg. KOH for its saponification, will show a saponification figure of 38, a saponification value of 190 and a saponification number of 76, all expressed as mg. KOH.

The following procedure for the determination of neutral fat by the saponification method is suggested:

1. *Free and Combined Fatty Acids (B)*[4].—Weigh 8 grams of the sample into a 500-c.c. beaker; add 50 c.c. of 95% alcohol and several drops of phenolphthalein indicator. Run in N/2 NaOH until end point is reached; boil gently until no more NH_3 is given off (to be tested for, with moist red litmus paper); cool; add N/2 NaOH again until the pink color persists; again boil to drive off any remaining NH_3 and add N/2 NaOH after cooling to bring to end point. Record the total number of cubic centimeters of N/2 NaOH required. Add 150 c.c. water and 5 c.c. methyl orange indicator, and titrate to acid end point with N/2 H_2SO_4. The number of cubic centimeters of N/2 H_2SO_4 required for this titration corresponds to the combined and free fatty acids. Calculate to mg. KOH per gram of sample = B.

2. *Alkali Minus Ammonia or Fixed Alkali (C)*[4].—In the test for combined and free fatty acids, the number of c.c. N/2 H_2SO_4 minus total number of c.c. N/2 NaOH used to make alkaline corresponds to the alkali minus NH_3. (In the case of the presence of ammonium salts this may be a minus quantity.) Preserve the sign and calculate to mg. KOH per gram of sample = C.

3. *Saponification Figure of Total Fatty Matter (F°)*[5].—Two to two and one-half grams of oil are boiled in an Erlenmeyer flask (Jena glass) of 200 c.c. capacity for thirty minutes under a reflux condenser with 25 c.c. of N/2 alcoholic potash measured from a pipette; a blank test with 25 c.c. of the solution is run simultaneously, every operation being exactly the same as with the sample. The blank test is necessary in view of changes of temperature and the solubility of the glass in alkali. After saponification, 50 c.c. of neutralized alcohol are added to the sample, boiled gently until no more NH_3 is given off (to be tested for with moist red litmus paper), and then titrated back with N/2 hydrochloric acid in the presence of phenolphthalein; the amount of acid necessary to neutralize the 25 c.c. is also determined. Calculate the amount of alkali absorbed by the fat to mg. KOH per gram = F°.

4. *Total Fatty Matter.*—Usual procedure.

It will be noticed that the saponification figure of total fatty matter is the only new determination; the others are taken from the present A. L. C. A. methods. From the above data the following formulas were derived:

Formula 1: Saponification figure of total fatty matter plus fixed alkali of sample, mg. KOH per gram = F° + C.

[1] Jour. A. L. C. A. **24,** 120 (1929).
[2] Chem. Umschau **36,** 97 (1929).
[3] Farber-Ztg. **25,** 169 and 194 (1914).
[4] Jour. A. L. C. A. **22,** 588 (1927).
[5] Holde-Mueller, First Eng. Ed., p. 342, 1915.

Formula 2: Saponification value of total fatty matter, mg. KOH per gram; $V^\circ = \frac{100\ (F^\circ + C)}{\%\ \text{total fatty matter}}$

Formula 3: Saponification figure of neutral fat, mg. KOH per gram; $Fn = (F^\circ + C - B)$.

Formula 4: Neutral fat, approximate per cent of sample; $p = \frac{100\ Fn}{V^\circ}$

Formula 5: Approximate saponification value of neutral fat, mg. KOH per gram; $Vn = (V^\circ - 10 + \frac{p}{10})$

Formula 6: Neutral fat, corrected, per cent of sample; $P = \frac{100\ Fn}{Vn}$

Formula 7: Neutral fat, corrected, per cent of total fatty matter $= \frac{100\ P}{\%\ \text{total fatty matter}}$

Formula 8: Saponification number of neutral fat, mg. KOH per gram $= \frac{100\ Fn}{\%\ \text{total fatty matter}}$

In Formula 4, the saponification value (V°) of total fatty matter or mixed fat has been used instead of the saponification value of the neutral fat, which is not known. Hence the per cent neutral fat (p) so calculated is only approximate and is always lower than the correct value, from which it may differ by as much as 5%. In Formula 5 an attempt has been made to calculate the saponification value of the neutral fat (Vn) in the mixture; this can be determined approximately only, as follows: It can be shown that the difference in the saponification values between neutral fat and the corresponding fatty acids is approximately 10 mg. With this assumption—and with the approximate per cent neutral fat (p) and the saponification value of total fatty matter (V°) given—the derivation of the following equation will be evident:

$$\frac{p}{100} Vn + (1 - \frac{p}{100})(Vn + 10) = 100\ V^\circ$$

which reduces to the following simple formula:

$$Vn = V^\circ - 10 + \frac{p}{10}$$

If we assume no lactones, anhydrides or other neutral fats that do not contain glycerine, Formulas 6 and 7 are probably correct to within the experimental error. Tables I and II below show the accuracy with which the saponification value of neutral fat, as well as the present neutral fat, may be calculated by means of the above formulas. Table I represents known mixtures of neutral fat and fatty acids, having saponification values of 190 and 200, respectively. Table II (corresponding to a castor oil product) represents similar mixtures with saponification values of 180 and 188, respectively.

TABLE I

SHOWING ACCURACY OF CALCULATING V_n

Saponification value neutral fat = 190 Saponification value fatty acids = 200

	Mixture No. 1	2	3	4	5
Neutral fat, actual per cent	00	20.0	50.0	70.0	100
Fatty acids, actual per cent	100	80.0	50.0	30.0	00
Theoretical saponification value of mixture (V°), mg. KOH	200	198.0	195.0	193.0	190
Theoretical saponification number of neutral fat, mg. KOH	00	38.0	95.0	133.0	190
Neutral fat (p) calculated, approximate per cent (Formula 4)	00	19.2	48.7	68.9	100
Difference between actual and approximate per cent neutral fat	00	—0.8	—1.3	—1.1	00
Calculated saponification value neutral fat (V_n), mg. KOH (Formula 5)	190	189.9	189.9	189.9	190
Neutral fat, corrected, per cent (Formula 6)	00	20.0	50.0	70.0	100
Difference between actual and corrected per cent neutral fat	00	00	00	00	00

TABLE II

SHOWING ACCURACY OF CALCULATING V_n

Saponification value neutral fat = 180 Saponification value fatty acids = 188

	Mixture No. 1	2	3	4	5
Neutral fat, actual per cent	00	20.0	50.0	70.0	100
Fatty acids, actual per cent	100	80.0	50.0	30.0	00
Theoretical saponification value of mixture (V°), mg. KOH	188	186.4	184.0	182.4	180
Theoretical saponification number of neutral fat, mg. KOH	00	36.0	90.0	126.0	180
Neutral fat (p) calculated, approximate per cent (Formula 4)	00	19.3	48.9	69.1	100
Difference between actual and approximate per cent neutral fat	00	—0.7	—1.1	—0.9	00
Calculated saponification value neutral fat (V_n), mg. KOH (Formula 5)	178	178.3	178.9	179.3	180
Neutral fat, corrected, per cent (Formula 6)	00	20.2	50.3	70.3	100
Difference between actual and corrected per cent neutral fat	00	0.2	0.3	0.3	00

G. W. Priest, chairman of the A. L. C. A. committee on sulphonated oils for 1929, and who instigated this paper, has kindly furnished the writer with the preliminary results of the work by his laboratory on the determination of neutral fat by various methods. In Table III is listed part of this data, from which were calculated, by means of Formulas 1 to 8, inclusive, the results given in Table IV. In Table V the neutral fat by extraction methods and the new method are compared.

TABLE III

ANALYSES OF SULPHONATED OILS

	Sample No. 215	216	243	244
Free and combined fatty acids (B), mg. KOH	72.36	77.10	77.61	54.34
Fixed alkali (C), mg. KOH	—4.32	—21.17	38.40	17.50
Saponification figure of total fatty matter (F°), mg. KOH	128.10	143.20	76.14	98.58
Total fatty matter, per cent	63.01	67.02	63.46	58.12
Neutral fat (petroleum ether extraction), per cent of sample	....	....	5.02	8.78
Neutral fat (ether extraction), per cent of sample	13.05	16.64	9.14	15.06

TABLE IV

NEUTRAL FAT BY CALCULATION

	Sample No. 215	216	243	244
Saponification figure of total fatty matter plus fixed alkali, mg. KOH	123.80	122.10	114.50	116.10
Saponification value of total fatty matter (V°), mg. KOH	196.50	182.20	180.40	199.80
Saponification figure neutral fat (F_n), mg. KOH	51.42	44.93	36.93	61.74
Neutral fat (p), approximate per cent of sample	26.18	24.66	20.47	30.90
Approximate saponification value neutral fat (V_n), mg. KOH	189.10	174.70	172.50	192.90
Neutral fat, corrected, per cent of sample	27.20	25.80	21.40	32.00
Neutral fat, corrected, per cent of total fatty matter	43.20	38.50	33.70	55.10
Saponification number of neutral fat, mg. KOH	81.70	67.00	58.20	106.00

TABLE V

NEUTRAL FAT METHODS COMPARED

Method	Sample No. 215	216	243	244
Petroleum ether, extraction per cent sample	....	....	5.02	8.78
Ether extraction, per cent sample	12.05	16.64	9.14	15.06
Saponification, or new method	27.20	25.80	21.40	32.00

It is evident from Table V that the results obtained by the saponification method are about twice as great as that by extraction with ether, and even greater when the extraction is made with petroleum ether. It seems, therefore, that extraction of the original undecomposed oil by solvents does not yield all of the neutral fat, or all the fat that will react with alkali. It would also seem to be established that some of the neutral fat must be sulphonated and, hence, partly soluble in water; consequently is only incompletely, if at all, extracted by solvents. It is also interesting to note that Herbig [6] extracted a sample of sulphonated castor oil (containing 59.9% total fatty matter and 5.8% organically combined SO_3) with cold acetone and found that the extract, supposedly the neutral fat, was 26.51% of the oil—a result more closely in agreement with the writer's method than with the present extraction method.

Neutral fat may conveniently be expressed in any one of the following ways:

1. Saponification figure; i. e., mg. KOH per gram of sample.
2. Per cent of sample.
3. Saponification number or "neutral-fat number"; i. e., mg. KOH per gram of total fatty matter.
4. Per cent of total fatty matter.

Results expressed by the last two methods are obviously more complete than by the others, since they already take into account the per cent total fatty matter in the sample; they offer also the advantage in that the composition of the fatty matter in different samples may be more directly compared. As the "neutral-fat number" (c) is more readily calculated than the per cent neutral fat and furnishes almost as much information, it would seem to offer the best means for reporting the latter.

A new method is suggested for estimating neutral fat in sulphonated oils by means of saponification tests. Detailed procedures are outlined and the necessary formulas developed.

Mention has already been made of the courtesy extended by Mr. Priest in supplying the data in Table III. The writer is also greatly indebted to Mr. Priest and to J. W. Harnly, research chemist of the Griess-Pfleger Tanning Company, Waukegan, Ill., for many helpful suggestions and corrections.—*Jour. A. L. C. A. October,* 1929.

[6] Loc. cit.

SULPHONATED OILS

(*Continued from page* 742)

there was only one thing to be done, and that was to take the necessary time and precautions for the ether or petrolic ether methods, which would mean, so far as time went, from three days to a week. For control work I was willing to do this. Below is a tabulation of the results of continuous work extending over more than two months. This work was done in triplicate and the checks were very close. The work was as carefully and as painstakingly done as in any research laboratory and performed by two very skilful oil chemists. I have every confidence in the accuracy of the results so far as the limitations of our laboratory equipment goes.

	215 Mg. KOH per Gram	%	216 Mg. KOH per Gram	%
Total alkali (A)	44.83	....	25.78	....
Total alkali (R)	—14.86	....	—8.65	....
SO_3 0.1426 (A + F)	....	4.274	....	2.24
Neutralized comb'd SO_3	....	6.37	....	3.56
Moisture	....	26.55	....	24.34
Ash	....	4.00	....	1.96
Unsaponifiable	....	0.66	....	1.69
Saponification number (uncorrected) E°	128.13	....	143.23	....
Free and combined fatty acids (B)	72.36	....	77.10	....
Alkali minus NH_3 (C)	—4.32	....	—21.17	....
NH_3 [0.030357 (A-C)]	....	1.49	....	1.43
Free fatty acids (B-A)	27.53	....	51.32	....
Sodium sulphate in ash due to combined SO_3	....	3.25	....	9
Sodium carbonate in ash due to combined fixed alkali comb. as soap	....	0	....	0
Total salts & impurities	....	0.75	....	1.96
Sodium bound as soap	....	0	....	0
Total fatty matter	....	64.18	....	67.02
Oleic acid	....	36.40	....	38.78
Neutral fat	....	27.78	....	28.24
Neutral fat (*)	sulp'ric ether	13.05	....	16.64
Neutral oil (*)	sulp'ric ether	13.71	....	18.33
Neutral fat (*)	petrolic ether	....	....	13.31
Neutral oil (*)	petrolic ether	....	....	15.00
Saponification equivalent fatty matter E°	128.13 mg. KOH		143.23 mg. KOH	
Saponification equivalent neutral fat E_n	51.45 mg. KOH		44.96 mg. KOH	
Neutral fat Hart method	....	26.18	....	24 68

(*) Extraction method.

	No. 243, Lot 2657 Mg. KOH per Gram	%	No. 244, Lot 2681 Mg. KOH per Gram	%
Total alkali (A).....	38.40	....	17.50	....
Total alkali (F).....	—4.09	....	18.55	....
SO_3 0.1426 (A + F)....	....	4.89	....	5.14
Neutralized comb'd SO_3	....	7.28	....	7.66
Moisture	....	26.50	....	32.14
Ash	....	10.03	....	7.98
Unsaponifiable	....	0.25	....	0.27
Saponification number. (This E^n does not include free fatty acids, ammonia as soap or ammonia as salts.)...	36.93	....	61.74	....
Free and combined fatty acids (B)	77.61	....	54.34	....
Alkali — NH_3 (C).....	38.40	....	17.50	....
NH_3 [0.030357 (A-C)].	....	0	....	0
Free fatty acids.....	39.20	....	36.84	....
Na_2SO_4 in ash due to combined SO_3	....	8.70	....	6.79
Na_2CO_3 in ash due to combined fixed alkali combined as soap....	....	0.39	....	0
Total salts & impurities	....	0.94	....	1.19
Sodium bound as soap.	....	1.57	....	0.72
Total fatty matter.....	....	63.46	....	58.12
Oleic acid	....	39.04	....	27.33
Neutral fat	....	24.42	....	30.79
Neutral fat (ether extraction)	....	9.14	....	15.06
Neutral oil (ether extraction)	....	9.39	....	15.33
Neutral fat (petrolic ether extraction) ...	....	5.02	....	8.78
Neutral oil (petrolic ether extraction) ...	....	5.27	....	9.05
Saponification equivalent fatty matter E^a.	76.14 mg. KOH		98.58 mg. KOH	
Saponification equivalent neutral fat E^n...	36.93 mg. KOH		61.74 mg. KOH	
Neutral fat Hart method	....	20.45	....	30.91

NEUTRAL FAT EXTRACTION METHODS

	215	216	243	244
Ether	13.05	16.64	9.14	15.06
Petrolic ether	....	13.31	5.02	8.78

This corroborates our work of a year ago that petrolic ether, while speeding up the work by giving sharper breaking emulsions, was too low in results for accuracy.

The manufacturer of oils Nos. 243 and 244 recommended the petrolic ether method for determination of neutral fat and reported the following figures:

	243	244
Neutral fat	12.27	20.85

I have great confidence in his laboratory technique and have never had more than a fraction of a per cent difference in our check-ups on other oil analyses, and am at a loss to explain this difference. Many complications can and do occur during analysis of castor oils which cause polymerization. In some cases the ether residue after complete aqueous wash and drying to constant weight was not soluble in alcohol and in other cases it was. The drying of such oily residues should be done either in vacuo or in a stream of inert gas. I had no such apparatus. It became apparent as time went on that I was dealing with a very complicated problem, but as I was about to send out samples to the committee Ralph Hart published his paper in the March A. L. C. A. Journal and I immediately got in touch with him and sent him the results of our analytical work so that he could figure out the per cent of neutral fat by his titration method. I was a bit skeptical when the results came back, but noticed that there was a relationship between his figures and ours. In a paper written by him which will shortly appear are quotations from reports of research work which is being done abroad, and which would make it appear that our conceptions of neutral fat in a sulphonated castor oil will have to be changed. During sulphonation some polymerization takes place which makes a water-soluble castor product and also leaves some unchanged castor oil. The titration method shows both of these products and is a true value of the oil. While we get by our regular method a figure by calculation, Mr. Hart's new method gives us one which is obtained directly. It will be observed in the paper which he is about to publish that our A. L. C. A. method, of which he is the father, does not differ more than 2% or 3% from this direct titration method.

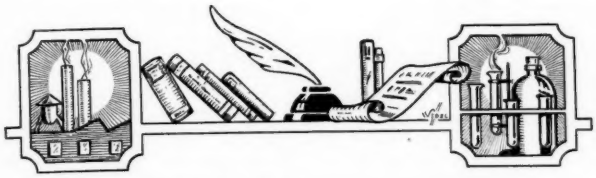
Conclusions

The method of Lewkowitch as outlined, using ether, in skilled hands, and with the use of vacuum drying ovens or one having a stream of inert gas during the drying period of the ether extract, gives a partial measure of neutral fat in a sulphonated castor. The time needed for the analysis is so long and the care and patience required so great that many sources of error can creep in, while the final figure is not an exact one. The modification using petroleum ether gives results much too low and should not be recommended as a standard method.

Mr. Hart's method is a quick, accurate method and appears to have behind it the weight of research work now being done overseas. It is evident that we are going to be obliged to change our ideas about the amount of neutral oil in a pure sulphonated castor oil and to recognize that there is about 26% of a fatty matter unsulphonated but saponifiable. I recommend that the committee make a study of this method for the coming year after Mr. Hart has published his paper.

The association is indebted to the Griess-Pfleger Tanning Company for its permission to allow its laboratory to give so much time to this work in spite of the fact that it uses practically no sulphonated castor oil. I am indebted to John W. Harnly, research chemist of the above firm, for the amount of work which he did and to Kenneth Matzinger. Ralph Hart has met me in a spirit of rare co-operation, and I am glad that

it has fallen to his lot to help out the tanning laboratories once more and to strengthen a seemingly weak spot in the A. L. C. A. method, which is his child.—*Committee Report, Twenty-sixth Annual Meeting, American Leather Chemists Association, Quebec, June 5, 1929.*



RECENT LITERATURE

Exact Colour Matching and Specifying. L. Blin Desbleds. 116 pages. 32 illustrations and diagrams. Technological and Industrial Service, Paris. Price $1.00.

There has always existed a wide gap between the fundamental facts of color production as applied by the physicist and the actual procedure of the textile colorist in the production of almost innumerable color effects upon cloth. One of the difficult problems of the teacher of textile coloring has been to bridge this gap and remove some of the obstacles which immediately confront the endeavors of the physicist to devise a system of scientifically accurate measurements which will eliminate the vagaries of the human eye in color matching and recording.

In this volume the author has endeavored to present an efficient industrial method of accurate color measurement and color matching through the use of the Toussaint photo-electric photo-colorimeter. This instrument involves the use of a photo-electric cell so designed that it permits of two specimens to be placed in succession and within a fraction of a second behind each of six monochromatic filters which correspond to six typical zones of the solar spectrum. Light rays from the standard and color under examination are directed upon the photo-electric cell, which is in circuit with a delicate galvanometer. From the tabulation of galvanometer readings the exact character of the color under examination may be determined and recorded. In addition to a detailed description of this apparatus, the book furnishes an extended discussion of its application and a rather condensed but readable discussion of color matching and recording. Like several other colorimetric devices, this apparatus makes it possible to record with a high degree of accuracy the character of any particular color in terms of wave lengths, and in this respect it may prove of considerable value in studying and recording colors already produced.

The author definitely states that photo-colorimetric dyeing is expedited if the dyer has at his disposal: (1) a large number of dyestuffs, many of which should be very pure; (2) a well-compiled set of reference curves, established once for all; (3) a stuff to be dyed nearly the same as that of the given standard. At the close of the volume he states that exactness and ease of application must lead to its widespread adoption and success. It is to be regretted that he has not gone into more detail as to how the colorist may use the instrument as an aid in actual color matching. Anything that will lead to a solution of this problem will be welcomed by every textile colorist who is scientifically inclined and by the textile manufacturer who is so frequently confronted with the problem of accurately specifying and reproducing colors.—*Louis A. Olney, Journal Industrial and Engineering Chemistry.*

NAPHTHOL AS: EFFECT OF FORMALDEHYDE, AND SUBSTANTIVITY

(*Abstract—E. Scheel, Leipziger Monats. Text.-Ind.*, 1929, 44, 79-80 and 126-128)

The action of formaldehyde in preventing the "corrosion" (i. e., the appearance of white patches on the deep yellow material) of cotton fabrics which have been impregnated in a Naphthol AS bath has been investigated. The effect of the formaldehyde is not instantaneous, but complete stability in air is attained only some time after its addition to the naphthol bath. In the interim there is a gradual increase in stability. The rate of formation of the formaldehyde compound depends on temperature and concentration, the formation of the addition compound proceeding more rapidly the higher the temperature and concentration. The naphthols vary in their specific behavior toward formaldehyde, its action being quickest with Naphthol AS-BS and AS-BG, and slowest with AS-RL.

The following series is arranged according to the time required to attain stability after addition of formaldehyde to solutions of normal strength: AS-BS, AS-BG, AS-BO, AS, AS-TR, AS-SW and AS-RL. If solutions of equal strength are considered the series is slightly different, Naphthol AS-SW preceding Naphthol AS. With Naphthol AS-BS and AS-BG, addition of formaldehyde at 30° C. produces almost instantaneous complete stability to air. Since the formaldehyde compound forms quicker in concentrated solution, the formaldehyde should be added to the concentrated naphthol solution and the whole be subsequently diluted. Raising the temperature above 50° is undesirable, since at higher temperatures formaldehyde gives precipitates with the majority of naphthols. —*Journal Textile Institute.*

J. B. Cook has been elected treasurer of the Wayland-Lloyd Company, Inc., Providence, R. I. George E. MacCartney has been elected treasurer of Allen & Allen, Inc.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

PRINT WORKS

Experienced man in color shop and laboratory work wishes position in either. Have worked on all classes of colors and materials. Am employed. Address: Classified Box 559, American Dyestuff Reporter.

POSITION WANTED

Print works chemist, with many years of experience in charge of large laboratory, seeks new connection. Has conducted successfully research and development in bleaching, dyeing, printing and finishing and secured ready co-operation with the various production departments. Has also made intensive study of the causes and reduction of mill seconds. Address: Classified Box No. 561, American Dyestuff Reporter.

DYEHOUSE POSITION WANTED

Young man, 25, Swiss, textile school graduate, wishes position in factory or laboratory of cotton or rayon dyehouse. Five years' experience, including two years as executive. Familiar with vat and Naphthol AS dyeing. Address: Classified Box No. 562, American Dyestuff Reporter.

INDANTHRENE SPECIALIST AND DYER

Experienced in Indanthrenes, naphthols, sulphurs, directs on rayon, silk and cotton. All types of machines. Address: Classified Box No. 563, American Dyestuff Reporter.

SALESMAN WANTED

Dyestuff salesman wanted. Thoroughly conversant with the requirements of the general trade to cover the province of Ontario, Canada. State experience, salary required and references. Address: Classified Box No. 564, American Dyestuff Reporter.

The Wayland-Lloyd Company, Inc., Providence, R. I., have taken over the dyestuff business of J. B. Cook. Mr. Cook has become associated with this firm, acting in the capacity of manager of sales. Mr. Cook's history of ten years of experience with the American Woolen Company and nine years with the S. R. David Company is well known to the trade.

CIBA NEW COLORS

In Circular No. 322 the Society of Chemical Industry in Basle brings to notice two new representatives of the Neolan series—Neolan Orange GRE and Neolan Brown R.

The circular describing these colors states: "Due to its excellent quality of level dyeing and its exceeding fastness to light, especially for piece dyeing, Neolan Orange GRE also is adapted for combining with other Neolan dyestuff. Cotton, rayon, and acetate silk effects remain white. The new product is advantageously used in printing due to its good solubility. Dyeings are discharged to a pure white with Hydrosulphite R Conc. Ciba. Neolan Brown R is suited for dyeing wool in all states of manufacture, such as loose wool, carded wool, yarn and piece. The dyeings are of excellent fastness to light and the new product combines readily with Neolan Orange GRE, Neolan Blue 2G, Neolan Green BL Conc. in preparing dark brown shades. Cotton effects are but lightly dyed, viscose and acetate silk remain pure white. Neolan Brown R can be used to advantage for coloring pure and weighted silk and also for the dyeing of leather. Dyeing is carried out in the customary manner for Neolan dyestuffs."

NATIONAL ANILINE & CHEMICAL CO. ANNOUNCE NEW DYE

The National Aniline & Chemical Company, Inc., have added a new dye to their line of developed blacks: National Diazine Black S Extra.

They state that when diazotized and developed the dye produces a rich bloomy black, and due to this quality, it is particularly suitable for mercerized cotton sewing thread, silk sewing thread, and silk piece goods. Diazotizing and developing also increases its fastness to light, perspiration, and hot pressing.

As a direct dye, they announce, it is used in shading raw cotton, cotton yarn, cotton piece goods, cotton and silk hosiery, cotton rayon and silk hosiery.

The bulletin remarks that the National Diazine Black S Extra dyes animal and vegetable fibers substantially the same, and is therefore adaptable for the dyeing of union fabrics, especially in the production of mode shades, and because of its solubility and level dyeing properties, it can be used in circulating machines.

William D. Appel of the United States Bureau of Standards, has accepted the chairmanship of the Joint Technical Committee on Silk Weighting, according to an announcement made recently by the Silk Association of America, Inc. G. H. Conze, former chairman, will remain a member of the technical committee.

The Enterprise Dye Works, Inc., Woonsocket, R. I., have taken out a permit for a small addition on First Avenue for a dyehouse service. for which general contract recently was let to Eastern Construction Co., Woonsocket.